THE EFFECT OF THE 1997 ASIAN FINANCIAL CRISIS ON ENVIRONMENTAL SPENDING IN THE REPUBLIC OF KOREA

By

Lawrence Kuo-Ming Chang

THESIS

Submitted to
School of Public Policy and Management, KDI
in partial fulfillment of the requirements
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MASTER OF PUBLIC POLICY

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ABSTRACT

THE EFFECT OF THE 1997 ASIAN FINANCIAL CRISIS ON ENVIRONMENTAL SPENDING IN THE REPUBLIC OF KOREA

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There have been a substantial number of studies on the causes of the 1997 Asian financial and economic crisis and its effects on Korea's economic development policy. Much less attention has been given to determining the effects on the environmental policy of Korea. This paper analyzes the movement of various environmental budgets in Korea, i.e. budgets for pollution abatement and control activities and for the Ministry of Environment, before and after the 1997 Asian financial and economic crisis to examine its impact on Korea's environmental policy. Budget data was drawn from a number of sources, including the OECD, the Bank of Korea, the Ministry of Environment of Korea and the Ministry of Planning and Budget of Korea. The evidence supports the hypothesis that the 1997 Asian financial and economic crisis negatively impacted environmental policy well beyond the immediate effects of the economic recession in 1998. Spending on the environment in Korea expanded at a much slower rate after 1997 than in the years leading up the Asian financial and economic crisis, which indicates a cessation or reversal of the prioritization of environmental policy among policy makers that began in the early 1990s in Korea.

Dedicated to My Molly

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This paper is truly the result of a wide collaborative effort. First, I would like to express my gratitude to my thesis advisor, Professor Jong-Il You, for his patience with me while I formed the ideas for my research and thesis paper. I would also like to express a heartfelt thank you to my dear colleague, study buddy and impromptu research assistant, Ms. Joo-Hee Noh. This thesis would not have been possible without her resourcefulness and tenacity at acquiring data. My appreciation also goes to Ms. Sophia Wong who reacquainted me with the fun in writing, as well as others who helped in various ways: Hyosung Bidol, for use of his old, clunky printer, and Irene Shen, for giving me a roof over my head. Lastly, I want to thank my Molly for encouraging and standing by me throughout this entire process, from the first day of class until the submission of this final thesis draft.

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I. INTRODUCTION

For most of the Republic of Korea's [hereafter Korea] industrialization drive from the 1960s to the 1980s, environmental issues were one of the least important concerns of policy makers. Instead, national priorities centered on economic development as an overriding policy goal, in particular on lifting the country out of poverty by increasing GDP. For several decades, Korea's decision makers devised policies that maintained high rates of economic growth at the expense of the environment and other issues. When democratization of the country took hold in the late 1980s, previously pent up social forces quickly entered the political discourse and played a part in reshaping various policies. It is in this context that the nascent environmental movement began to mature and press Korea's policy planners for stronger environmental policies. In response, the Korean government intensified efforts in the early 1990s to reverse the environmental degradation that had accumulated from Korea's industrial expansion.

By the 1980s, Korea was suffering from serious air, water and soil pollution. Rapid development had markedly scared the natural environment of Korea. The skies were clouded by pollution from industry and transport. The rivers and coastal areas were contaminated by innumerable sources of economic activity, including industry, agriculture, and construction. Solid waste was becoming a serious problem as the nation became wealthier and consumption patterns changed. There was recognition of the complexity of the situation as a multitude of other environmental issues came to light, such as dumping of hazardous and radioactive waste, loss of biodiversity, loss of natural habitat, etc.

Korea was beginning to make significant progress in cleaning up and reducing these environmental ailments when the Asian financial and economic crisis[1] struck in 1997. This event shocked the national psyche. Since Korea's recent modern history has been defined by an ability to consistently generate high economic growth rates, the reversals of the financial crisis pushed other issues to the bottom of the national agenda. Policy makers focused most of their attention and energy on economic recovery. By 1999, however, Korea's economy was in full recovery, growing at a rate that outpaced even the most optimistic estimates from just a year earlier.[2]

Initially, environmental budgets rebounded along with the economy. However, as the economy continued to improve, these budgets failed to grow at rates that were comparable to those of the early and mid-1990s. While a temporary reduction or slowdown can be attributed to a crisis-period decision, a pattern of slower funding increases, significantly different than before 1997, indicates that Korea's environmental issues became less important to policy makers after the crisis. The significance of this observation becomes more apparent when noting that spending by the government on other services returned to approximately pre-crisis growth rates after the economy recovered from the crisis.

Policy makers continue to publicly support environmental issues, but the financial backing for environmental policies after the crisis has not matched the official rhetoric. An examination of the changes in spending on the environment in Korea in the years following the financial crisis will demonstrate that it negatively impacted long term environmental policy. In particular, this paper will focus on the budget trends for pollution abatement and control activities. Although these

[1] The 1997 Asian financial and economic crisis will be referred to as the financial crisis or crisis throughout the remainder of the text.
[2] See *Asian Development Outlook 1998,* Asian Development Bank, 1998, pp. 46 – 49; *Economic Survey: Korea*. Paris, France: OECD, 1998; and "On their feet again?" *The Economist*. 19 Aug. 1999.

expenditures represent only a portion of environmental spending, these budgets provide a rough indication of the general direction of Korea's environmental policy; in this case, they will help establish that the priority for environmental activities among policy makers diminished in the wake of the crisis.

My analysis will show that the growth rates of the public sector budget for pollution abatement and control slowed down considerably after the financial crisis. This is a significant finding since increases prior to 1997 had been very high, more than double the annual average of GDP growth and more than 50% faster than the rate of increase of the General Account of the government budget. After the crisis, growth in pollution abatement and control expenditure was much slower, averaging less than a third of the rates of both GDP and the General Account, despite the fact that both were notably low in that period. Similar, changes in budget trends also occurred in the business sector expenditures on pollution abatement and control, as well as with the budget for the Ministry of Environment of Korea.

This indicates that the importance of environmental policy relative to other policy goals, in particular economic development, declined after the crisis. Prior to the crisis, Korea's decision makers were making concerted efforts to move in the direction of good environmental governance. Korea was responding well to international pressure (in terms of world opinion for its environmental policies and requirements for joining various international organizations, such as the OECD) and the lobbying and political action of domestic environmental groups. After the financial crisis, however, policy makers interrupted the earlier momentum in Korea's environmental policy because they believed that the recovery of the economy depended on a shift in policy priority.

It is important to consider the timing and reasoning for the shift in environmental policy as it relates to the debate around sustainable development. Korea was already a developed country when the financial crisis created the conditions under which policy makers lowered the priority of its environmental policies. Therefore, the wealth of a country does not guarantee good environmental governance. For developing countries that are considering adopting a development model similar to Korea, this serves as an important lesson. It may not be feasible to pursue a policy of high growth rates at the expense of the environment because clean-up will always entail making difficult choices. Economic development policies that take into consideration environmental issues then may prove more advantageous, since less damage would have accumulated in the process of development. Korea's policy makers were diverting resources for economic development after the financial crisis not because the economy was performing poorly, but compared to Korea's history of high growth rates, the performance of the economy after 1999 seemed unacceptable low.

This paper is divided into six sections. In the next section, I will give a brief overview of the effects of rapid economic development on the natural environment of Korea and. In Section 3 and 4, I will begin my analysis by examining the budgets for pollution abatement and control expenditures in the public sector and business sector, respectively. I will further expand my argument in Section 5 by investigating the changing trend in the growth of the budget for the Ministry of Environment and the total environmental budget of Korea. Then I will review the current state of Korea's environment in Section 6 by evaluating selected environmental indicators and linking the changes in environmental budgets and policies with real world outcomes for the natural environment. I will conclude the paper in Section 7 and discuss some possible

implications from the shift in Korea’s environmental policy, as well as possible directions for further research in this area.

II. OVERVIEW: DEVELOPMENT AND ENVIRONMENTAL DEGRADATION

Korea succeeded in engineering a dramatic transformation of its economy during the second half of the 20th century. Beginning in the early 1960s, Korea's economy grew by leaps and bounds, changing from an agricultural economy to an industrialized economy to a high-tech, service economy today. In 1996, Korea became a member of the Organization for Economic Cooperation and Development (OECD) – the club of rich nations. The scale of this transformation, accomplished within four short decades, has been repeatedly described as an "economic miracle".[3]

However, in recent years, discourse on Korea's development has moved from analysis of its success, i.e. the policy elements that delivered sustained, high growth rates, to analysis of the costs of such rapid industrialization. During the industrialization drive of the 1960s, 1970s and 1980s, Korea's policy makers consistently prioritized the economy over other issues. This one-dimensional policy approach to national development, best summed up by the term "growth first", was successful at lifting the country out of poverty, but it came at a high environmental cost (as well as other social and political costs[4]).

By the 1980s, Korea was struggling from severe air, water and soil pollution. Rapid development and the rise of heavy manufacturing industries released millions of tons of air pollutants creating concentrations of SO_2, O_3, and CO in major metropolitan areas that were up to three times greater than national standards. High

[3] See World Bank. *The East Asian Miracle: Economic Growth and Public Policy*. Washington, D.C.: World Bank, 1993 and Schuman, Michael. "The Miracle Workers." *Time Asia Magazine,* Vol. 166, Nos. 7/8, August 15-22, 2005.

[4] Korea was governed by a series of military dictatorships beginning with from 1961 to 1987. The process of economic development during this period was generally enforced with a heavy hand. Along with the repression, the Korea's military regimes also coaxed the citizenry into accepting the rule of authoritarian governments with the promise of economic development and rising income levels.

rates of urbanization instigated an unending process of construction of housing, offices, roads and subways, which choked urban areas with airborne particulates. The increase in automobiles added to the clouding of the skies with smog.

Municipal, industrial and agricultural water contaminants polluted the waterways and coastal areas of Korea. Untreated sewage and waste water reduced the water quality of the four major rivers, with the Han River rarely exceeding the international Grade III standard. Discharge of heavy metals such as cadmium, lead and zinc by large industrial complexes decimated fisheries near the coast and greatly reduced shell-fish harvests. And chemical pesticide, fertilizer and herbicide runoff from farms contaminated soils and leached into underground aquifers.

These pollution problems are not unlike the ones faced by other industrialized countries during the process of development. For Korea, however, these difficulties are magnified and exacerbated by special characteristics of the country, such as one of the highest population densities in the world and a very limited natural resource base, resulting in severe environmental degradation.[5]

Governmental Environmental Action in the 1990s

The Korean government began tackling pollution and environmental degradation in the late 1980s and intensified efforts in the early 1990s. The impetus for the government's adoption of a stronger environmental policy was due in large part to the advocacy work of the environmental movement in Korea.[6] Policy makers enacted "almost the entire body of environmental legislation now in use"[7] in Korea

[5] Moon Chung-in, and Lim Sung-hack. "Weaving Through Paradoxes: Democratization, Globalization, and Environment Politics in South Korea." *East Asian Review*. 15(2), Summer 2003, p. 46.
[6] See Eder, Norman. *Poisoned Prosperity: Development, Modernization, and the Environment in South* Korea. M.E. Sharpe, Inc, 1996. for a thorough and detailed account of the development of the environmental movement and its influence on public policy in Korea.
[7] OECD. *Environmental Performance Reviews: Korea*. Paris, France: OECD, 1997.

through a flurry of legislative activity in the early 1990s. Of the 38 current environmental laws in existence in Korea, 33 were created during this period.[8] The new legislation both significantly expanded and reinforced the body of laws and regulations governing the restoration and protection of the environment in Korea.

In tandem with passing more laws, policy makers also elevated the governmental agency responsible for the environment to a ministerial level office in 1990 – from the Environment Agency to the Ministry of the Environment[9] (hereafter MOE). The MOE was further upgraded in 1994 and given full ministry status with greater authority, increased manpower and broader jurisdiction. At the same time, a myriad of issues relating to the environment, which had been under the charge of other agencies were consolidated within the MOE. In particular, the Water Supply and Sewage Treatment Bureau of the Ministry of Construction, Potable Water Management Division of the Ministry of Health and Social Affairs, and Water Quality Inspection Department of the National Health Institute were all transferred to the MOE.

Korea's policy makers demonstrated their ability to act decisively on pressing environmental issues in the early 1990s. They created a more comprehensive set of environmental laws to address the broad range of environmental issues. They strengthened institutions by placing responsibility for the environment under one agency and elevating that agency to a ministerial power. In effect, policy planners armed the government with the powers needed to clean up and protect the

[8] See Appendix I for a listing of Korea's environmental legislation.

[9] "The Ministry of Environment is the primary government agency responsible for the overall protection of Korea's environment. The Ministry's activities currently focus on improving the ambient environment (managing waste, securing and delivering clean water, ensuring air quality, and protecting ecosystems), harmonizing environmental and economic policymaking, and enhancing international cooperation on transnational environmental challenges such as the yellow dust phenomenon and climate change." Source: Ministry of Environment website at <http://eng.me.go.kr>.

environment.[10] The changes are tantamount to a reorganization of national priorities – a move away from the "growth first" policy of economic development that had dominated decision making in Korea since the 1960s.

Improvements in Air Quality

The strengthening of environmental policy in the 1990s has resulted in some impressive environmental gains. Most notable has been improvements in several Type II pollutants.[11] For example, in the late 1980s, common air pollutants, such as sulphur dioxide (SO_2), total suspended particulates (TSP) and heavy metal, i.e. lead (Pb), significantly exceeded national standards in many of Korea's major cities. SO_2 in Seoul averaged over 0.050 ppm (parts per million) each year from 1985 (the earliest year of available data) to 1991, while levels for TSP and lead were also very high.[12]

However, the introduction of key environmental and energy policies, in particular, the tightening of emission standards and a switch to low-sulfur fuels, has brought about a steady decrease in the concentration of these air pollutants.[13] By

[10] As early as 1963, Korea had enacted the Anti-Public-Nuisance Control Law to protect the environment. However, the early laws were ineffective because there were no administrative or enforcement mechanisms to enforce compliance and because government support of economic expansion effectively bypassed the strictures of the legislation. Eder, Norman. *Poisoned Prosperity: Development, Modernization, and the Environment in South* Korea. M.E. Sharpe, Inc, 1996.

[11] Pollution can be categorized into three types. Type I pollution is poverty-related and occurs mostly in developing countries with inadequate basic infrastructure resulting in a lack of access to clean water and sanitation. Type II pollution is associated with industrial production and is problematic for countries in the process of rapid industrialization and urbanization. Common Type II pollutants include SO2 and suspended particulates, heavy metal water pollution, and industrial solid waste. Type III pollution is due to consumption and lifestyle changes that are based on mass production, mass consumption and mass disposal. Common Type III issues are increasing CO_2 emissions, over consumption of resources, increased municipal waste generation, and loss of biodiversity. See Bai, Xuemei and Hidefumi Imura. "A Comparative Study of Urban Environment in East Asia: Stage Model of Urban Environmental Evolution," *International Review for Environmental Strategies*, Vol. 1, No. 1, 2000, pp. 135 – 158. for a more detailed explanation of the three types of pollution and the process of evolution from Type I to Type II to Type III.

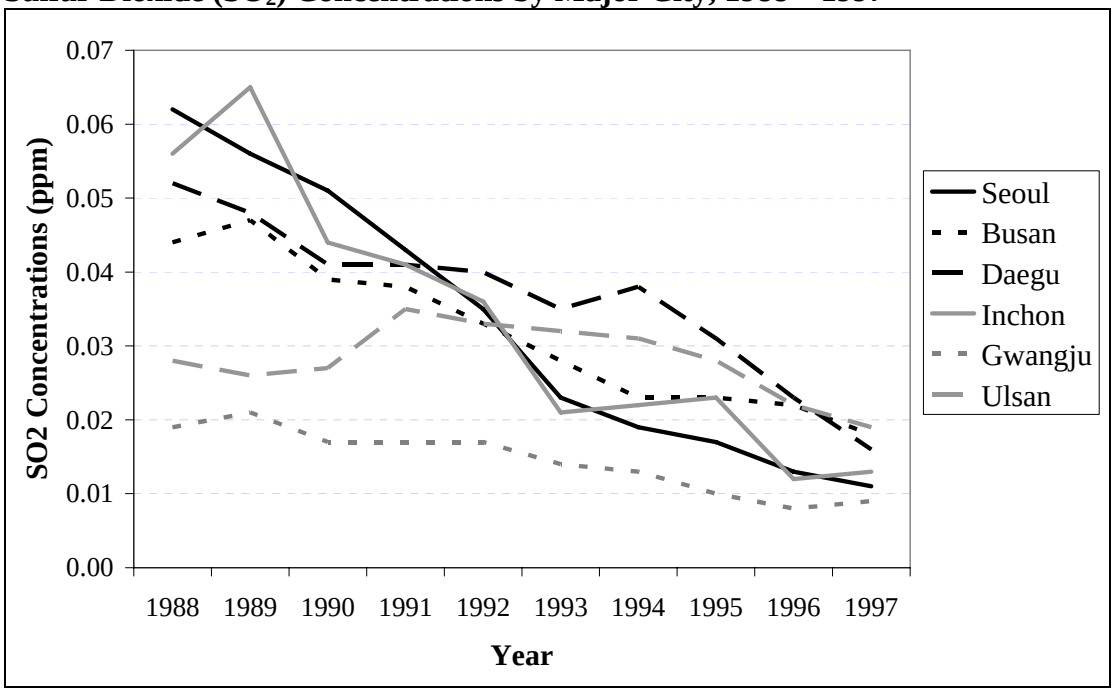
[12] See Appendix II for measurements of various air pollution in Korea. Guidelines on air pollution put out by Korea's Ministry of Environment are reproduced in Appendix III for comparison purposes.

[13] OECD. *Environmental Performance Reviews: Korea*, Paris, France: OECD, 1997.

1997, annual average SO_2 concentration in Seoul was 0.011 ppm, down from 0.051 ppm in 1990, a reduction of almost 80%. Lead (Pb) concentration fell to 0.1088 ㎍/㎥ (micrograms per cubic meter) from 0.3408 ㎍/㎥ in 1991, a decline of almost 70%. And ambient levels of TSP in Seoul decreased by over 50%.[14] Similarly, other major metropolitan areas in Korea also registered large reductions during this period, ranging from 30% – 70% of 1990 pollution levels [See **Figures 1 & 2.**].

Figure 1.

Sulfur Dioxide (SO_2) Concentrations by Major City, 1988 – 1997

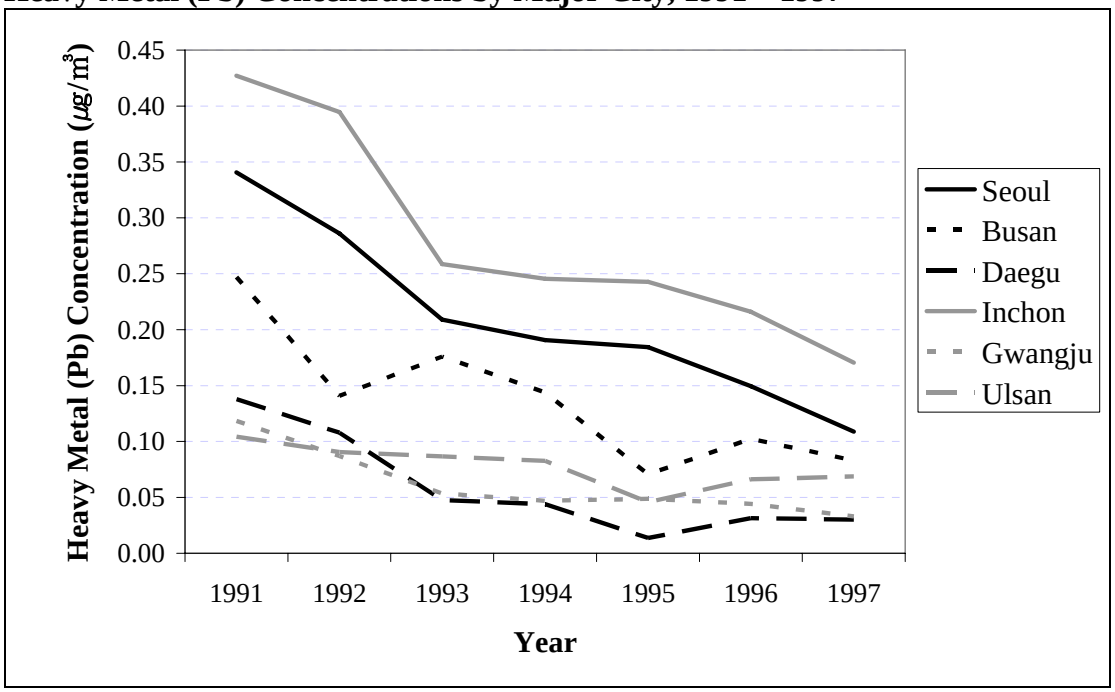


Source: National Statistics Office, Republic of Korea

[14] OECD. *State of the Environment Report*. Paris, France: OECD, 2002

Figure 2.

Heavy Metal (Pb) Concentrations by Major City, 1991 – 1997



Source: National Statistics Office, Republic of Korea

Stabilizing Water Quality

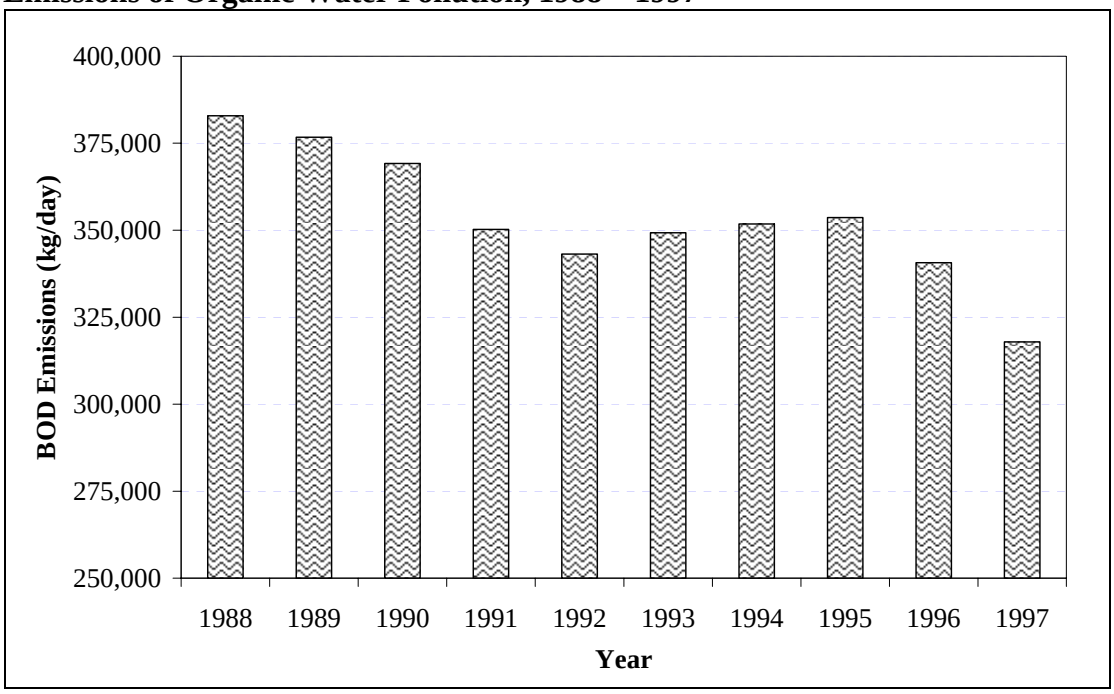
Korean policy makers enacted the Water Quality Preservation Act in 1990, which imposed stricter emission standards on water pollution. As a result, emissions of organic water pollution declined from 382,898 kilograms per day in 1988 to 317,902 kilograms per day in 1997, representing a 17% decrease [See **Figure 3.**]. Water quality of the Han River, the primary source of tap water for the Seoul metropolitan area, began to improve in the early 1990s. The BOD[15] level of the Han River, fell to an average of 4.0 ppm (parts per million) in 1993 from over 10.0 ppm in the late 1980s. And the water quality of the three other major rivers, the Nakdong, Geum and Yeongsan River, remained relatively constant during this period.

[15] Biochemical oxygen demand (BOD) is an indication of the presence of sewage and other organic wastes in water. High levels of BOD can deplete the oxygen in water and result in the death of fish and other aquatic organisms that are unable to escape such conditions. The national standard for Grade I water quality is a BOD measurement of less than 1 ppm. Refer to the table on Grade Level Index in Appendix IV for a listing of the water quality standards of Korea's water bodies.

Unfortunately, conditions in all four major rivers deteriorated in the mid-1990s due to a series of severe droughts from 1993 to 1995.[16]

Figure 3.

Emissions of Organic Water Pollution, 1988 – 1997



Source: World Bank

Generating Less Municipal Waste

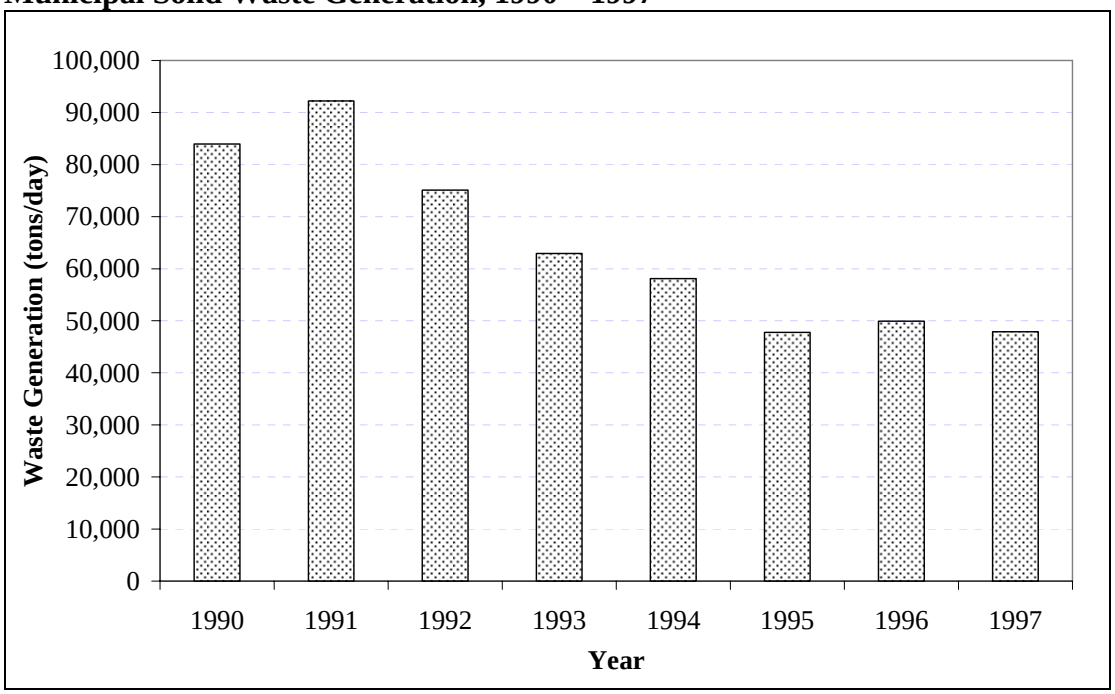
The amount of municipal solid waste generated each year in Korea also declined in the 1990s. Waste generation had increased dramatically in the 1980s due to many factors, including the high rate of urbanization, increasing income levels and changes in consumption patterns. But, from a peak of 92,246 tons per day in 1991, municipal solid waste generation declined to 47,895 tons per day in 1997, a cut in waste generation by almost half [See **Figure 4.**]. In terms of the intensity of waste

[16] Shortages of rainfall during these years caused water levels in the four major rivers to drop significantly and the river systems lost the ability to clean themselves naturally. So, even with declining emissions of water pollutants, concentrations of pollutants in the rivers increased from 1993 to 1995.

generation, which is the amount of waste that is generated per person each year, in 1991 per capita waste was 773 kg, but in 1997 it was only 378 kg, over a 51% decline. So, not only did total waste generation fall in these years, the amount generated per person decreased slightly faster. This is significant considering that the population growth rate in Korea was also falling during this period.

Figure 4.

Municipal Solid Waste Generation, 1990 – 1997



Source: National Statistics Office, Republic of Korea

These are just some examples of environmental improvements in Korea in the early 1990s. It is an indicator of the strides in improvement that Korea has made with respect to various environmental media since policy makers increased the priority of environmental policy. Although these early efforts proved largely successful, changes in the prioritization of environmental policy after the financial crisis, especially in relation to economic development policy, resulted in more paltry improvements in environmental quality. In the following sections, I will examine the budgets for

pollution abatement and control activities in Korea before and after the 1997 financial crisis to demonstrate how the early trends in environmental policy did not carry through the crisis.

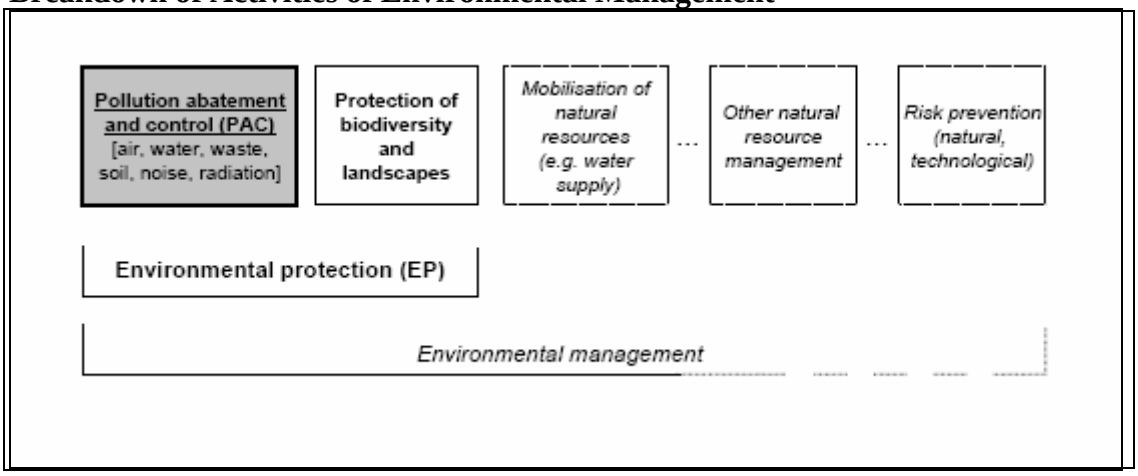
III. PUBLIC SECTOR PAC EXPENDITURE

Pollution Abatement and Control Activities

I begin my analysis by examining expenditures for pollution abatement and control (PAC) activities in the public and business sectors to determine the effects of the financial crisis on Korea's environmental policies. Although PAC expenditures represent only a portion of total spending on environmental activities [See **Figure 5.**], it provides a general indication of a country's environmental policy efforts. From this I will extrapolate more information about Korea's environmental policies. By examining PAC expenditures before and after the financial crisis, it may be possible to draw some conclusions regarding changes in the policy between these two periods.

Figure 5.

Breakdown of Activities of Environmental Management



Source: Reproduced from OECD. *Pollution Abatement and Control Expenditure in OECD Countries*. Paris, France: OECD, 2003. Retrieved on 14 March 2005.

For the purposes of our analysis here, I will be using the definition for PAC activities[17] from the OECD's 2003 report: *Pollution Abatement and Control*

[17] In the report, PAC activities are defined as "purposeful activities aimed directly at the prevention, reduction and elimination of pollution of nuisances arising as a residual of production processes or the

Expenditure in OECD Countries. The report aggregates spending into four categories – waste water, waste, air and other[18] – which are labeled as environmental domains. These correspond roughly to spending on control of pollution affecting water, land and air. Data in the OECD report is drawn from information provided by the Bank of Korea. In this paper, I will make use of the data from the OECD report for the years 1995 to 2000, [19] as well as data from the Bank of Korea which has estimates of expenditures for 1993 and 1994 and information on spending from 2001 to 2003. I begin my analysis by considering changes in public PAC expenditures

Public Sector PAC Expenditures

Public sector spending on PAC activities grew significantly between 1993 and 1997 [See **Table 1.**]. Public PAC Expenditure increased a total of 77.7% during this period, averaging 15.5% annual growth. During this same period, the General Account of the Korean government increased by only 41% and managed an average annual growth rate of 9%. Clearly, spending by the public sector on pollution abatement and control activities was increasing at a faster pace than the general government budget in the years leading up to the financial crisis. (Public PAC spending was also growing at double the rate of Korea's GDP.)

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consumption of goods and services". This definition excludes many other activities which are environmental in nature but not directed specifically at mitigating or eliminating pollution from economic activity, such as natural resource management, prevention of natural disasters, or health and safety regulations that have environmental benefits. OECD. *Pollution Abatement and Control Expenditure in OECD Countries*. Paris, France: OECD, 2003.

[18] The information on public and business expenditure on PAC activities is broken down into four (4) environmental domains: Waste water, Waste, Air, and Other. 'Other' includes the following categories: protection and remediation of soil, groundwater and surface water, noise and vibration abatement, protection against radiation, research and development, and general administration and management. For a detailed description of the measures and activities of each domain, consult Table 2 on page 17 of OECD. *Pollution Abatement and Control Expenditure in OECD Countries*. Paris, France: OECD, 2003.

[19] The data presented in the 2003 OECD report is recorded according to the "abater principle", which measures the amount spent on the implementation of an activity. This is in contrast to the "financing principle", which measures the amount spent on the financing of an activity. For more information, refer to OECD. *Pollution Abatement and Control Expenditure in OECD Countries*. Paris, France: OECD, 2003.

Table 1.

Annual Growth of Total Public PAC Expenditure, the General Account and GDP in Korea, 1994 - 1997

Year	Total Public PAC Expenditure[20]	General Account	GDP
1994	14.2%	8.1%	8.3%
1995	17.2%	15.2%	8.9%
1996	9.2%	8.2%	6.8%
1997	21.7%	4.7%	5.0%
Total	**77.7%**	**41.1%**	**32.2%**
Annual Average	**15.5%**	**9.0%**	**7.2%**

Source: Bank of Korea; IMF; Ministry of Planning and Budget, Republic of Korea

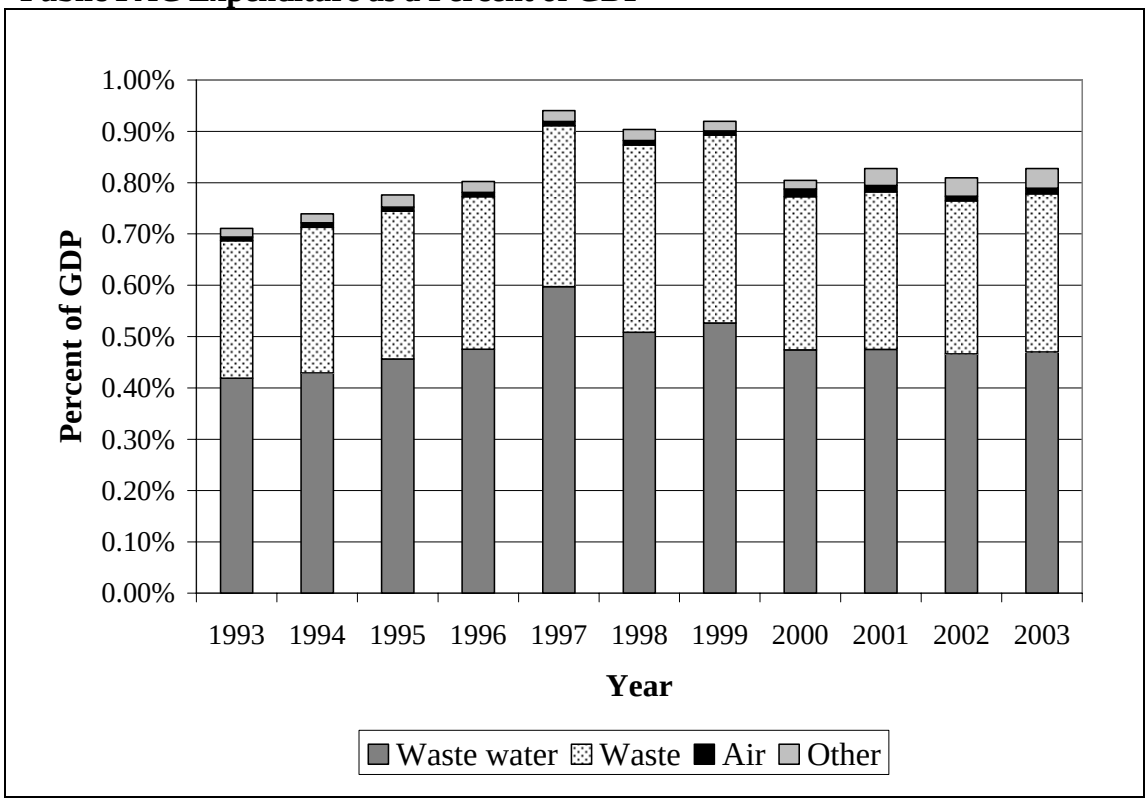
More notable, however, is the fact that public sector spending on PAC activities also increased ***relative*** to total economic activity in Korea [See **Figure 6.**]. Public PAC Expenditure **as a percent of GDP** increased from 0.71% of GDP in 1993 to 0.94% of GDP in 1997. Although this figure is less than the OECD average of 1.5% of GDP,[21] it still represents a significant improvement considering that the Korean economy was also growing rapidly during this period. This increase in spending on pollution abatement and control indicates an intensifying commitment by the Korean government to environmental issues in the years leading up to the financial crisis.

[20] While there are varying upward and downward changes in public PAC expenditures within environmental domains, it is not within the scope of this paper to go into the reasons behind the variations in spending in different environmental domains. I am focusing on the total figure for public PAC expenditure in order to establish an indication of the overall approach to the environment by policy makers.

[21] You, Jong Il. "The Korea Model of Development and its Environmental Implications," Chap. 9 in *The North, the South, and the Environment: Ecological Constraints and the Global Economy*. New York: United Nations University Press, 1995.

Figure 6.

Public PAC Expenditure as a Percent of GDP



Source: OECD; Bank of Korea

Reductions in Public PAC Expenditures in 1998

When the financial crisis in Asia reached Korea, policymakers in Korea were devastated. Korea recorded its first negative annual growth rate in 18 years with the economy contracting by almost 7%. As a result of the crisis and recession, as well as the austerity measures imposed along with the IMF rescue package, the Korean government was forced to reduce public spending in many areas. PAC activities were also affected by these cutbacks. From 1997 to 1998, spending by the public sector on pollution abatement and control fell by over **12%**. If changes in spending by environmental domain are considered, then Waste water spending experienced the largest reduction, falling by over **22%**, pulled down by a large cut in the investment

expenditure component.[22] Spending for the category of Other also decreased significantly, while spending in the remaining two categories, Waste and Air, were relatively unaffected (Waste spending grew by 6%, and spending on Air dipped by less than 1%).[23]

An interesting observation can be drawn from these figures. First, the impact of the crisis on public PAC expenditure varied according to environmental domain. Only two categories experienced large budget cuts,[24] while the others either remained stable or increased. This suggests that some environmental issues warranted continued attention from policy makers. For example, spending on Waste continued to increase during the crisis, so it seems to reason that the growth of solid waste remained a high priority for government officials. Thus, for high priority issues, policy makers were able to find the funding to keep PAC activities from being cut. This establishes that political will can account as much for the funding of a project as prevailing economic conditions; and the recession in 1998 need not have resulted in deep cuts in public PAC expenditure.

[22] Each PAC expenditure figure is composed of investment expenditure, internal current expenditure (operational expenses), and the subsidies and fees for pollution abatement and control that are spent by various economic agents. It excludes depreciation, cost of capital and payments for violations or compensation, including fines, penalties and interest.

[23] The fact that reductions more severely impacted investment expenditure may lead to greater environmental problems in the future. By reducing the amount of investment expenditure for any particular environmental domain, policy makers have delayed the construction of new facilities to deal with pollution. This may prove extremely problematic for Korea in its ability to adequately treat future pollution loads in various environmental media. For example, the demand for waste water treatment in Korea continues to exceed current capacity. Without the timely introduction of additional capacity, environmental pressures will increase as the percentage of waste water treated fails to meet adequate levels.

[24] Spending on Waste water accounted for the majority of public PAC expenditure (56.3%), while spending on Other ranked second to least (2.4%). This fact effectively rules out assertions that the Korean government was cutting the most expensive activities as a means to more efficiently utilize public resources during the crisis.

Indications of Changes in Environmental Policy

Although the reductions in public PAC expenditure in 1998 raise some questions about the process by which policies are prioritized by decision makers, I am more interested in the changes in public PAC spending in the years following the recession. If the magnitude of the crisis and the economic uncertainties that it generated are valid reasons for temporarily reducing public budgets, I would expect that budget cuts would be reversed when the economy improved. In this section I will compare changes in public PAC spending to changes in the governments General Account[25] to demonstrate that environmental policy was eroded by the financial crisis.

The Korean economy recovered quickly from the financial crisis, expanding by almost 11% in 1999. Public PAC expenditures and the government General Account also posted similar rates of growth that year with 9.7% and 9.1% increases, respectively [See **Table 2.**]. Although the economy, along with the General Account, was still growing at a rapid pace in 2000, public spending on PAC activities fell 7.5%. As a percentage of GDP, public PAC expenditure represented only 0.8% of Korea's GDP in 2000, down from 0.9% in 1998.[26] Except for the recessionary year 1998, this is the first time since 1993 (the earliest available year for data on public PAC expenditure) that total public PAC spending did not increase when the economy was expanding.[27]

[25] The General Account is divided into the following budget line items: National Defense, Education, Social Development, Economic Development, General Administration, Grants to Local Government, Repayment of Debt & Others, and Other Expenditures.

[26] In fact, total public PAC expenditure in 2000 (adjusted for inflation) was only 1% greater than spending in 1998, when Korea was in a recession.

[27] Interestingly, public PAC expenditures began to increase in 2001 (albeit at a much lower rate than before the crisis) even though the economy had slowed down considerably relative to the first two years of recovery following the financial crisis. GDP grew by a little over 3% in 2001 due to the global economic slowdown and by 2.5% in 2003 because of a drop in domestic demand attributed to tightened consumer credit.

Table 2.

Annual Growth of Total Public PAC Expenditure, the General Account and GDP in Korea, 1999 - 2003

Year	Total Public PAC Expenditure	General Account	GDP
1999	9.7%	9.1%	10.9%
2000	- 7.5%	7.8%	9.3%
2001	4.5%	7.4%	3.1%
2002	3.0%	7.6%	6.3%
2003	5.7%	4.3%	2.5%
Total	**5.1%**	**29.9%**	**22.9%**
Annual Average	**1.3%**	**5.4%**	**5.3%**

Source: World Bank; Ministry of Budget and Planning, Republic of Korea

The financial crisis seemed to dampen governmental enthusiasm for spending on the environment. From 1999 to 2003, public PAC expenditures increased a total of only 5.1%, averaging 1.3% annual increases. This is in stark contrast to total growth of 77.7% during 1993 – 1997 (with an average annual rate of 15.5%). The General Account, however, was not subject to the same resistance to budgetary growth. After the financial crisis, the General Account expanded by almost 30%, which was still a very respectable, considering that total growth before the crisis was 30.5%. Since growth in public spending on PAC activities did not resume after the financial crisis had abated as the General Account did, it appears that the government had quietly shifted environmental issues to the policy backburner after the financial crisis.

In this section I developed the argument that environmental policy in Korea changed after the financial crisis. I began by examining public PAC expenditure at the time of the crisis and found that budget cuts were not equal across environmental domains. Then I showed that the public PAC spending grew at a slower rate and

represented a smaller portion of GDP after the crisis. Lastly, I compared PAC expenditure to the General Account before and after the crisis to show that funding for PAC activities did not resume pre-crisis growth rates in the same manner that the General Account did.

The findings in this section seem to indicate that policy makers in Korea were not forced by the financial crisis to implement serious changes in the funding of public PAC expenditure. Instead, policy makers who were not fully committed to environmentalism may have used the opportunity of the crisis to push through desired changes in environmental policy. If environmental policies remained a high priority after the financial crisis, then public PAC spending should have returned to rates of increases that matched the pre-crisis trend, especially since the economy began to perform well again just a little over a year after the initial onset of the crisis. But this was not the case, as I demonstrated in this section.

Since spending on the General Account began to grow again at rates comparable to those before the financial crisis, it raises the suspicion that increased funding was available for environmental spending. Therefore, it seems that it was not the circumstances of the financial crisis that forced a change in environmental policy, but rather it was a pretext for downgrading the priority of the environment without putting the issue to public scrutiny. Policy makers continued to vocally support environmentalism, but they did not provide the same budget commitments that existed before the crisis. In the next section, I will examine business spending on PAC activities and evaluate how government leadership is crucial for convincing the private sector to maintain needed levels of spending.

IV. BUSINESS SECTOR PAC EXPENDITURE

In the previous section, I examined data on public PAC expenditure before and after the financial crisis and argued that official attention on the environment had waned after 1998. In this section, I will examine the effect of the financial crisis on business sector PAC expenditure. Analysis of the changes in business PAC spending will provide more information about the change in direction of Korea's environmental policy after the financial crisis.

From 1993 to 1997, business PAC expenditure grew by over 67%. Recall that total public PAC spending grew by almost 78% during the same period [See **Table 3.**]. This indicates that changes in environmental policy were having an impact on private sector behavior as well. By 1997, however, total business PAC spending had already begun to slow considerably. Internal current expenditure was still increasing, but spending on the investment expenditure for three of the four environmental domains had declined significantly. This translated into an anemic overall growth rate of 1.5% for business PAC expenditure in 1997. Note, however, that public PAC expenditure that same year had increased by 21.7%. It is clear then that the business sector reacted more quickly than the government to the rapidly changing economic conditions as the financial crisis unfolded in late 1997.

Table 3.

Growth of PAC Expenditures and GDP Before and After the Financial Crisis

Period	Business PAC	Public PAC	GDP
1993 – 1997	67.8%	77.7%	32.2%
1999 - 2003	30.7%	5.1%	22.9%

Source: OECD; Bank of Korea

Changing Trends in Spending After the Financial Crisis

In 1998, business PAC spending was down 22.6% (almost twice as much as the drop in the public sector). This sharp decline can be explained simply as reduction due to sound business decision making. Basically, businesses increase activities during expansionary economic periods and reduce activities during contractionary periods. So, as economic conditions soured in 1997 and quickly became recessionary in 1998, it is reasonable for businesses to reduce investment and look for other cost-cutting measures, including spending on PAC activities. With an improving economic situation, the reverse should be true. Businesses would have the means to invest in environment-related expenses.

It is not unreasonable then to expect the growth rates of business PAC expenditure to converge towards pre-crisis levels with the passing of the financial crisis. Even with low growth in 2001 and 2003, [28] Korea's GDP still managed a rate of expansion in 1999 – 2003 of approximately two-thirds of the total for 1993 - 1997. But, despite this economic turnaround, growth in business PAC spending did not increase more quickly. Even with an impressive jump in spending of 17.8% during the economic recovery in 1999, growth in business PAC expenditure for the period 1999 to 2003 was less than half of the 67.8% total for 1993 to 1997.[29] [See **Table 4.**] As a percentage of GDP, business PAC expenditure performance was just as disappointing, remaining below pre-crisis levels until 2002.

[28] See Footnote 27.
[29] Similarly, the average rate of growth in business PAC expenditures from 1999 to 2003 was just slightly under 7%, whereas it was almost 14%, from 1993 to 1997.

Table 4.

Comparison of PAC Expenditure Growth, 1998 - 2003

Year	Total Business PAC Expenditure	Total Public PAC Expenditure	GDP
1999	17.8%	9.7%	10.9%
2000	6.3%	-7.5%	9.3%
2001	6.0%	4.5%	3.1%
2002	10.5%	3.0%	6.3%
2003	5.0%	5.7%	2.5%
Total	**30.7%**	**5.1%**	**22.9%**
Annual Average	**6.9%**	**1.3%**	**5.3%**

Source: OECD; Bank of Korea

Difference between Public and Business Sector Responses to the Financial Crisis

Another point of interest is that business PAC expenditure dropped in all four environmental domains. This did not happen in the public sector. And it is a reminder of the poignant difference between the approaches of the two sectors to environmental issues. The public sector, though responsive to economic conditions, must ultimately also be accountable to larger social goals – in this case, the people's desire for a cleaner environment.[30] So, pressure on the public sector to cut government spending and reduce PAC spending during the crisis was tempered to some degree by the need to meet society's expectations of environmental quality.

[30] Careful scrutiny of the spending by environmental domain by the business and public sector reveals a noticeable difference in commitment between the two sectors. Between 1995 and 2000, the business sector spent approximately the same amount on the three environmental domains of Waste water, Waste and Air. Starting in 2001, there was more discrepancy in the amount of spending between these three categories, but it was still distributed fairly evenly. Compare this to spending by the public sector, which concentrated its PAC budget on the areas of Waste water and Waste. During the entire period 1993 to 2003, spending on PAC activities for these two categories accounted for well over 90% of all public PAC spending. These differences are a reflection of the differing priorities of the two sectors. The business sector had to clean up the waste and pollution that resulted from production processes. The public sector had to meet environmental target goals for society, such as sewage connection rates and drinking water quality.

Business sector PAC spending felt relatively less pressure from these constraints in their response to the crisis.

With the onset of the financial crisis, the business sector immediately adjusted the level of funding of PAC activities to the degree permitted by environmental policy. In the new policy climate of the crisis, however, this amounted to large reductions in environmental budgets, including PAC expenditures.[31] Korean officials were very concerned about the state of the economy following the crisis and were determined to revive the economy at any cost. And as with the "growth first" policy during Korea's industrialization drive, the environment again bore the brunt of the costs. The private sector had demanded a relaxation of environmental regulations immediately following the financial crisis. The Ministry of Environment obliged by "pledging to remove 193 regulations (30 percent of total regulations) and loosen 185 regulations (28.8 percent)".[32] By bowing to business pressure during the financial crisis, Korean policy makers abdicated the leadership role of government on the environment and sent a clear signal that the environment could be sacrificed to some degree for the sake of economic recovery. Official support for effective environmental policy turned into rhetoric.

[31] "Big Enterprises Cut Facilities Investment for Environment." *Korea Times*. 10 Oct. 1999.
[32] Moon Chung-in, and Lim Sung-hack. "Weaving Through Paradoxes: Democratization, Globalization, and Environment Politics in South Korea." *East Asian Review*, 15(2), Summer 2003.

V. ENVIRONMENTAL BUDGET OF KOREA

In the previous two sections, I analyzed the trends in the PAC expenditures in the public and business sector to demonstrate that the financial crisis had created the opportunity for a shift in environmental policy in Korea. In the late 1990s, policy makers were beginning to adopt a new approach to environmental policy that focused more on pollution prevention rather than pollution control. This may have contributed to the decline in PAC spending. However, by examining the changes in the budget trends for the total environmental budget[33] of Korea, I will counter the objection that new policy designs were the main cause for changes in PAC budgets. I will demonstrate that the same pattern of changing budget trends applies to Korea's environmental budget over the period 1994 to 2003, which further strengthens my claim that an environmental policy shift occurred after the financial crisis.

Upon initial examination of Korea's environmental budget, it appears that policy planners continued to place a high priority on the environment because allocations to the budget continued to increase each year after the crisis. From 1994 to 2003, the total budget increased by over three-fold and averaged over 17% annual growth [See **Table 5.**].

[33] The environmental budget of Korea as published by the Ministry of the Environment is an aggregate of 1) the budget for the Ministry of Environment, 2) the budgets for environment-related activities in other ministries, and 3) the budget for Investment Expenditure on Water Quality by the Ministry of Finance and Economy. For my analysis, I am relying only on data for (1) and (3) as published and available in English by the Ministry of Environment, South Korea.

Table 5.

Growth Rates for Korea's Environmental Budget, 1994 - 2003

Year	MOE Budget	Water Quality Improvement	Total
1995	42.67%	25.3%	36.7%
1996	31.5%	27.5%	30.2%
1997	22.0%	72.6%	37.7%
1998	3.1%	-10.7%	-2.3%
1999	3.6%	9.5%	5.7%
2000	12.9%	38.8%	22.4%
2001	8.6%	31.5%	18.1%
2002	1.4%	16.7%	8.5%
2003	-2.1%	10.8%	4.4%
Total	**197.6%**	**536.0%**	**314.6%**
Annual Average	**12.9%**	**22.8%**	**17.1%**

Source: Ministry of Environment, Republic of Korea

Analyzing the Components of the Environmental Budget

However, closer examination of the two components of the environmental budget, the Ministry of Environment budget and the budget for water quality improvement, reveals some interesting findings. First, the MOE budget grew at a much faster rate before the economic crisis than after. The annual average rate of increase between 1993 and 1997 was 31.8%. It was only 5.0% between 1999 and 2003. This translates into a total growth of 129% for 1994 – 1997 and only 22% for 1999 – 2003 [See **Table 6.**]. So, compared to the explosive growth before the financial crisis, the MOE budget was almost stagnant after the crisis. This is a significant change in budget trends and follows the same pattern as public PAC spending during those years.

Table 6.

Growth of the Environmental Budget Before and After the Financial Crisis

Period	MOE Budget	Water Quality Improvement	Total
1994 - 1997	129%	175%	145%
1998 - 2003	22%	136%	64%

Source: Ministry of Environment, Republic of Korea

Second, the budget for Allowance for Water Quality Improvement grew almost the same amount before and after the crisis [See **Table 6.**]. As such, it became an increasingly larger portion of the total environmental budget in the years after the crisis, representing 53% of all spending on the environment in 2003. Therefore, the growth in the budget for Allowance for Water Quality Improvement effectively buoyed spending on the environment and explains how the environmental budget continued to increase, even after the financial crisis.

Comparison with the General Account of the Government

Another interesting observation about the total environmental budget is that it grew slower than the General Account of the Korean government in the period after the financial crisis [See **Table 7.**]. The General Account grew by 29.9% between 1999 and 2003, which was slightly higher than growth in the MOE budget However, for 1994 to 1997, the General Account expanded by 30.5%, but growth in the MOE budget was almost five times greater between 1994 and 1997. The continuance of the funding increases for the General Account indicates that policy makers were able to find the money for the other government ministries. Therefore, the weak growth of the MOE budget after the financial crisis was a policy choice, not because decision makers were forced to reformulate environmental policy in the face of economic

uncertainty. Policy makers kept the MOE budget almost unchanged even as official rhetoric continued to support a strong environmental policy.

Table 7.

Comparison of Growth in the Environmental Budget and the General Account

Period	Total Environmental Budget	General Account
1994 – 1997	145%	30.5%
1999 – 2003	64%	29.9%

Source: Ministry of Environment, Republic of Korea

One might claim that growth in the environmental budget after the financial crisis could not have kept pace with growth in the General Account because government spending was highly inflated for purposes of economic recovery. The need for government intervention during the financial crisis would have resulted in the injection of significant amounts of resources into the General Account. Therefore, even if the environmental budget did grow at a reasonable rate – enough to sustain the policy goals at the time – the jump in various budget areas of the General Account, i.e. Economic Development, would have overshadowed the increases in spending on the environment.

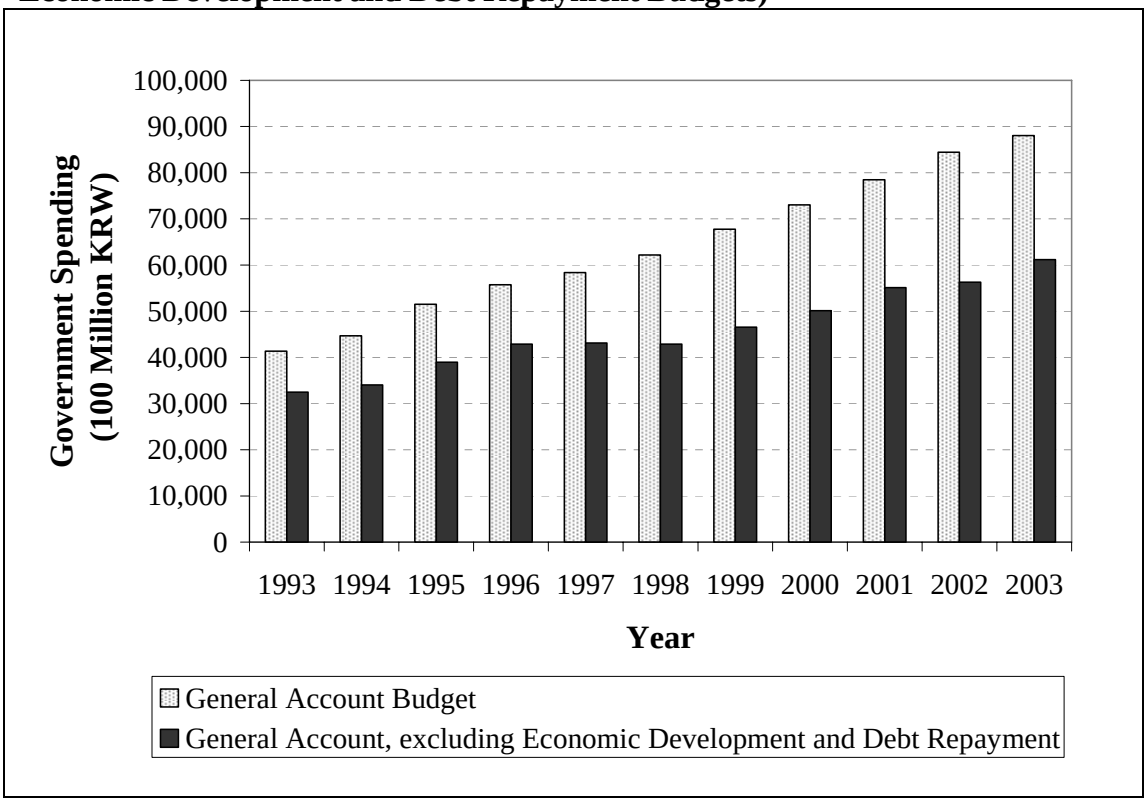
The government did, in fact, increase the budget for Economic Development in 1997 and 1998 to stimulate the economy and spent large sums to repay the loan from the IMF. However, for the period 1999 – 2003, the growth rate of the budget for Economic Development was actually lower than before the crisis.[34] In fact, it decreased three times in the years after the financial crisis. Moreover, spending in

[34] The annual average rate of growth of the Economic Development budget line item in the General Account was only 2.7% for the period 1999 – 2003. It was more that 5 times greater in the years before the crisis, averaging 14.8% annually.

five of the eight budget areas of the General Account increased more quickly than the budget for Economic Development after the crisis. So, the growth in General Account after the financial crisis is not completely attributable to growth in Economic Development spending. Much of the spending was, in fact, not crucial for economic recovery efforts [See **Figure 7.**].

Figure 7.

Government Spending on the General Account (Inclusive and Exclusive of Economic Development and Debt Repayment Budgets)



Source: Ministry of Planning and Budget, Republic of Korea

The analysis of the environmental budget in this section further supports my claim that environmental policy in Korea changed after the financial crisis. Although the official position of Korea's policy makers throughout the 1990s is one of strong support for the environment, the change in the budget trend after the financial crisis indicates a change in attitude and policy. It seems likely that policy makers were

capitalizing on the situation of the financial crisis to quietly shift official (and public) attention off environmental issues and programs. As I stated earlier, businesses in Korea was very active in lobbying the government for environmental "reforms" in the wake of the financial crisis. The private sector believed that environmental regulations impeded the ability of businesses to recover from the crisis. Whether these claims were valid or not, the result was a change in environmental policy, which is reflected in the changes in budget trends discussed in the previous three sections. In the next section, I will compare selected environmental indicators before and after the financial crisis to establish a connection between the changes in environmental budget trends and the current state of the environment Korea.

VI. CURRENT STATE OF SELECTED ENVIRONMENTAL INDICATORS

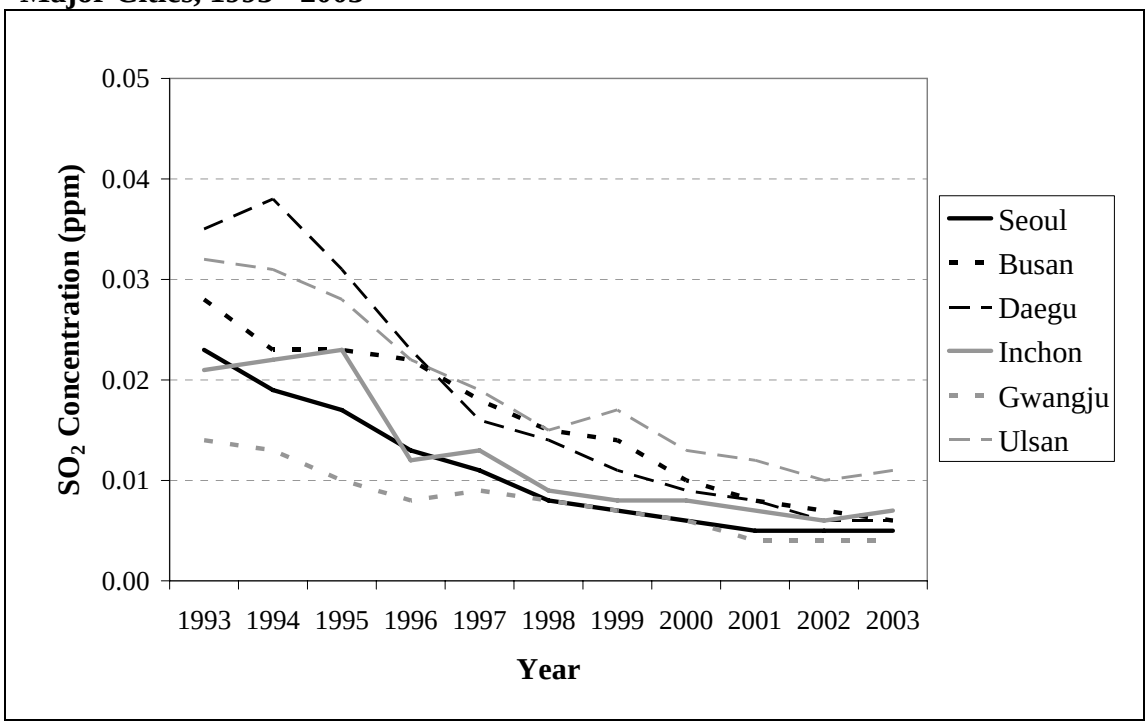
In the previous sections, I established that the funding for the environment in Korea was adversely affected by the financial crisis. Initially, resources were diverted to economic recovery activities. But, even after the economy recovered in 1999 and began another period of growth, the various environmental budgets continued to grow slowly while other areas of government spending, i.e. the General Account, began expanding at approximately the pre-crisis rate. In this section, I will examine various environmental indicators to determine how the sluggish environmental budgets affected the state of pollution in Korea after the crisis.

As stated before, there had been significant improvement in air quality in Korea starting in the late 1980s. The atmospheric concentration of second-phase pollutants, such as sulphur dioxide (SO_2), total suspended particles (TSP), and heavy metal (lead), decreased steadily throughout the first half of the 1990s. However, these indicators have not improved discernibly after the financial crisis.[35] From 1998 to 2003, the ambient levels of these pollutants for Korea as a whole have remained roughly constant. In the case of suspended particulate matter, concentrations began to increase after 1998 and are only just beginning to decline. Of course, the pollution situation differed between Korea's major cities, but the overall effect was a lack of significant improvement. The decreases in air pollution in some of Korea's major cities were offset by increases in other cities [See **Figures 8, 9, and 10.**].

[35] Note that these indicators continue to decrease each year when measured in units per capita or units per dollar GDP. However, such improvements in terms of "efficiency" do not automatically translate into absolute reductions. Since population and GDP are both increasing over time, small gains in efficiency improvements in some cases cannot compensate for overall total growth.

Figure 8.

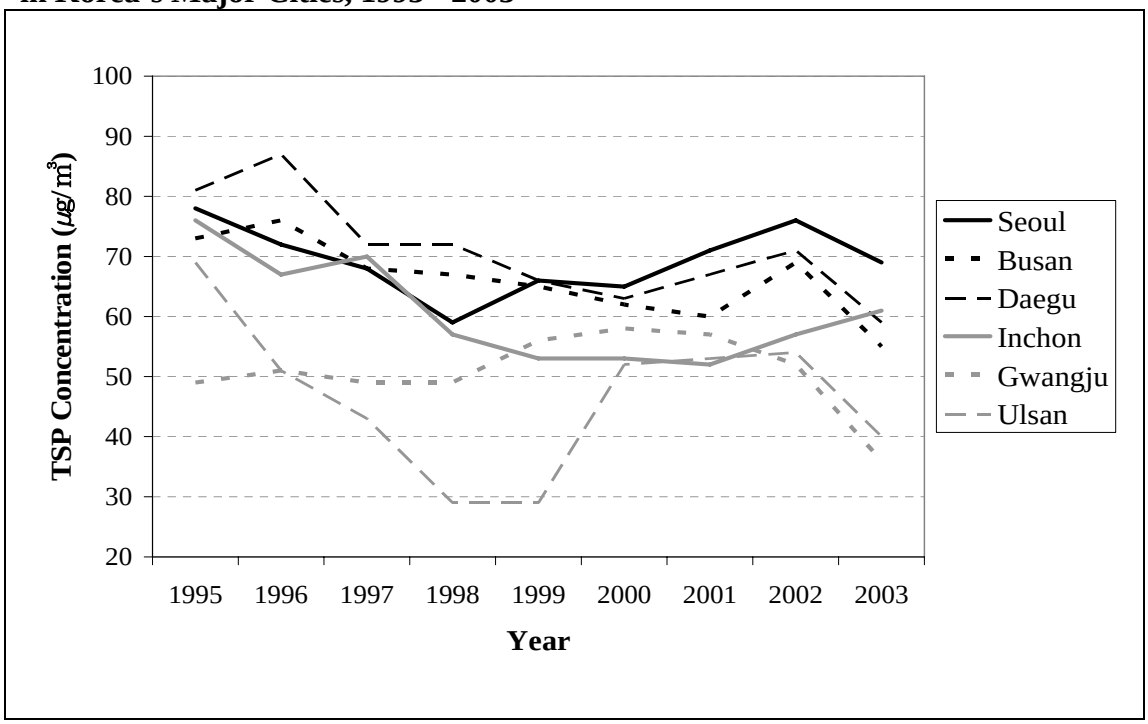
Average Annual Ambient Concentration of Sulphur Dioxide (SO_2) in Korea's Major Cities, 1993 - 2003



Source: National Statistics Office, Republic of Korea

Figure 9.

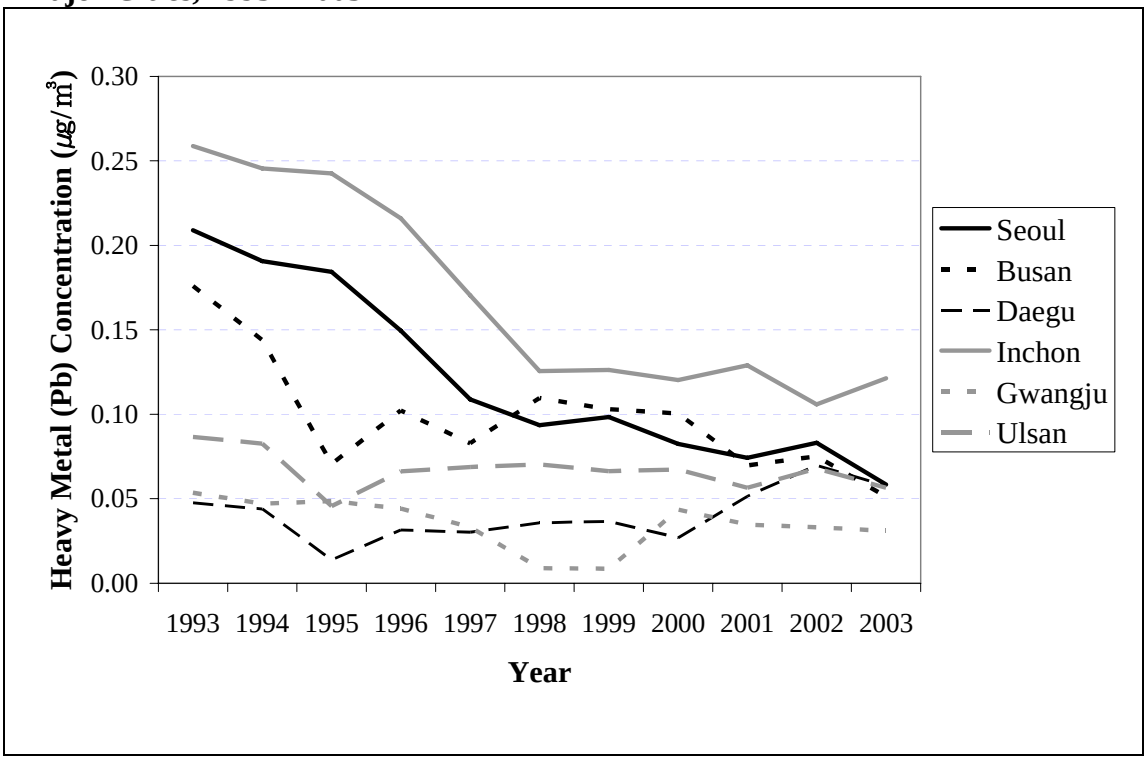
Average Annual Ambient Concentration of Total Suspended Particulates (PM_{10}) in Korea's Major Cities, 1993 - 2003



Source: National Statistics Office, Republic of Korea

Figure 10.

Average Annual Ambient Concentration of Heavy Metal: Lead (Pb) in Korea's Major Cities, 1993 - 2003



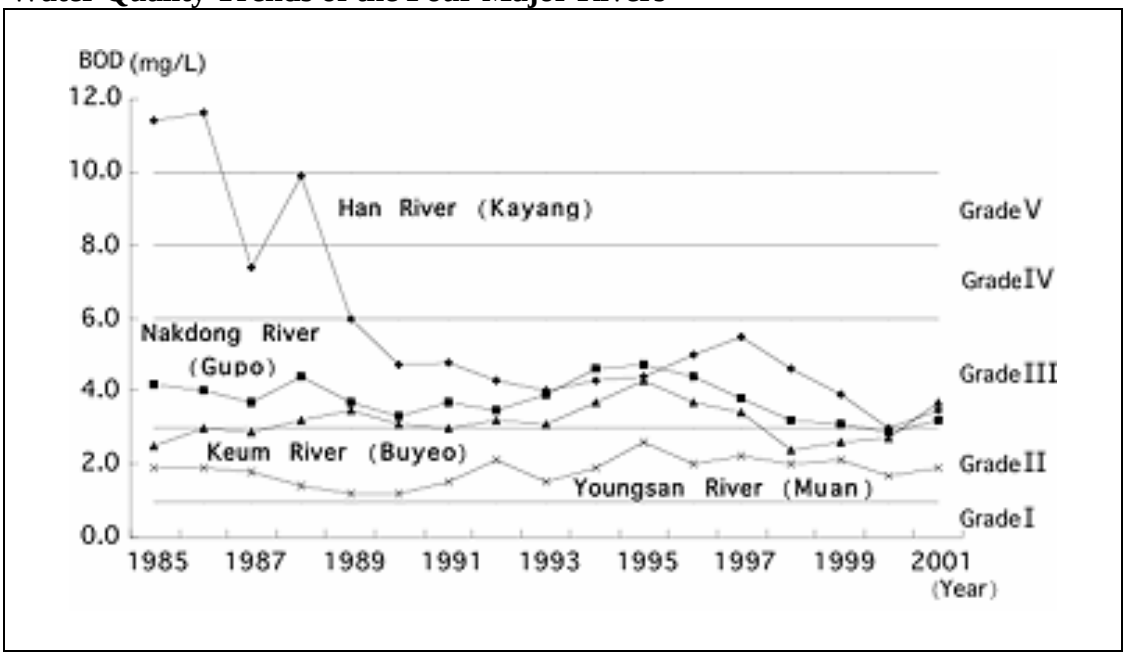
Source: National Statistics Office, Republic of Korea

Similarly, issues of water quality and solid waste generation also failed to improve after 1997. While BOD levels declined slightly in the years after 1997, compared to levels in the early 1990s, it did not represent any significant overall improvement.[36] The rivers in Korea remained generally remained at the same grade levels that were achieved in the early 1990s.[37] Three of the four major rivers were at Grade Level III at the end of the decade; while the stayed at Grade Level II [See **Figure 11.**].

[36] Recall, that water quality had worsened in the mid-1990s due to several years of severe drought. Therefore, in many instances BOD levels were higher at the time of the financial crisis than in the early 1990s. So, even though BOD levels declined after 1997, net improvement for the 1990s was negligible.
[37] Policy makers have recognized the need to address the issue of poor water quality in Korea. The continued expansion of the budget for Allowance for Water Quality Improvement after the financial crisis is evidence to this fact. For an overview of the Korean government's efforts at water management, see the report to the United Nations titled *Freshwater Country Profile: Republic of Korea*. Follow-up Report to the World Summit on Sustainable Development, United Nations, 2004.

Figure 11.

Water Quality Trends of the Four Major Rivers

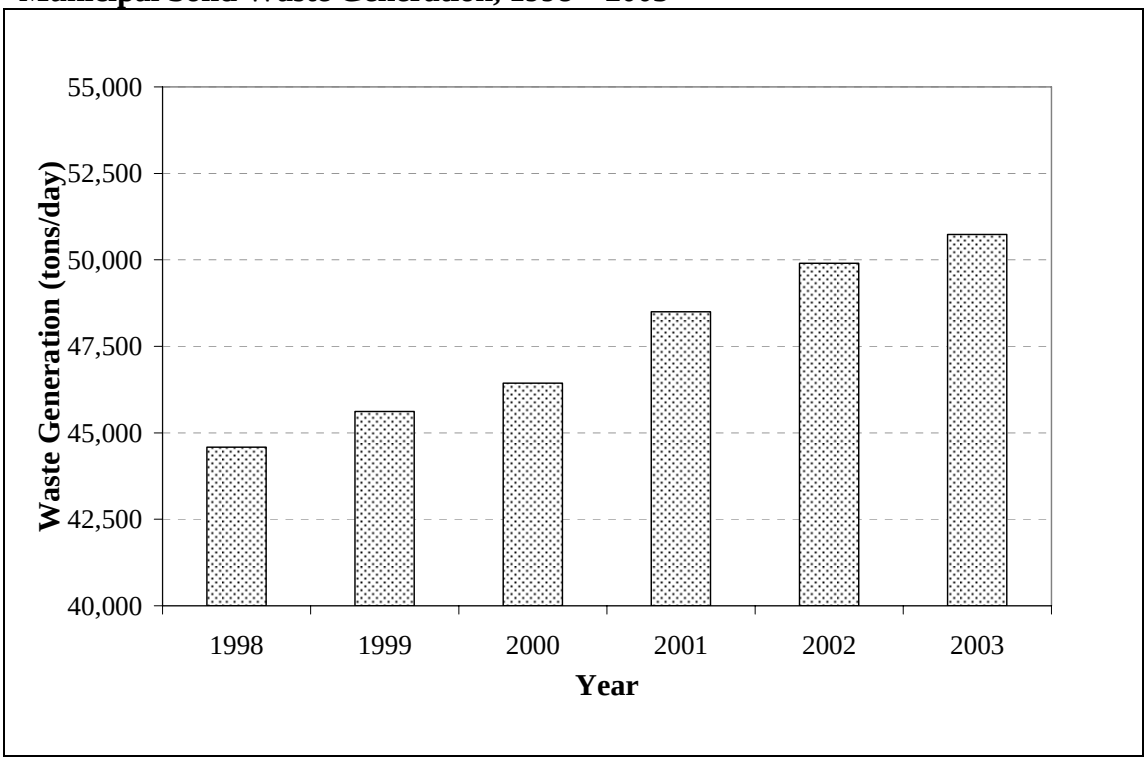


Source: Reproduced from Environmental Information Network in North East Asia Region at <http://www.npec.or.jp/northeast_asia/en/environmental/page03.html>

Improvements in reduction of solid waste generation also failed to carry through after the financial crisis. Generation of municipal solid waste had fallen dramatically in the early 1990s, but began to increase again after 1998 [See **Figure 12.**]. The amount of increase from 1998 to 2003 is approximately 14%, which is not very large. However, it does represent a clear change in the trend of municipal solid waste generation. In addition, coupled with the alarming increase in industrial and construction waste during the same period (74%), it is imperative that policy makers do more to address the issue of solid waste in Korea, especially since there is already major difficulties associated with the adequate disposal of such waste.

Figure 12.

Municipal Solid Waste Generation, 1998 – 2003



Source: National Statistical Office, Republic of Korea

From reviewing the state of a few select environmental indicators, it is clear that the financial crisis had a significant impact on environmental policy. Korea managed to achieve some impressive environmental gains from the late 1980s to the mid-1990s, especially with respect to Type II pollutants. But, environmental quality ceased to improve much in the years following the financial crisis. This denotes a correlation between the slowdown in the growth of the environmental budget and the lack of improving environmental indicators. Therefore, more must be done by policy makers, in particular provision of adequate funding of existing policies, in order to regain the momentum of environmental improvement that was evident before the financial crisis. The current stalemate in the fight against Type II pollutants means that further reductions may require increased commitment by policy makers, more than they have been willing to provide after the financial crisis.

In addition, as Korea continues to develop and become wealthier, it will have to face the issue of Type III pollutants, some of which are already becoming evident.[38] CO_2 emissions will continue to increase as the economy grows and requires more energy inputs. NO_x emissions will also increase due mostly to growing numbers of automobiles on the road. And generation of solid waste will increase as Korea continues its transformation into a mass consumption society. The evidence of handling of environmental policy after the financial crisis suggests that Korean policy makers may be unable to contend with the emerging problems of Type III pollutants. Future success will depend on the degree to which policy makers can decouple economic development and emissions growth. Sustainable development has been trumpeted as the means to achieve such goals, but it will require making difficult policy choices, which policy makers have already demonstrated to be unpalatable in the wake of the financial crisis.[39]

[38] See Footnote 11 for a description of Type III pollutants.

[39] The Korean government adopted Green Vision 21 in 1995 as a comprehensive and integrated strategic plan for sustainable development. "The main objective of Green Vision 21 is to improve the quality of life by maintaining the balance between development and conservation, without compromising the well being of future generations. It also deals with the concerns of ministries other than the MOE, in the areas of natural environment conservation, air quality management, water quality management, marine environment preservation, drinking water supply management, waste management, and environmental technology development." United Nations. *National Assessment Report on the Implementation of Sustainable Development: Republic of Korea*. Report to the World Summit on Sustainable Development, United Nations, 2002.

VII. CONCLUSION

In this paper I demonstrated that the 1997 Asian financial and economic crisis has had a persistent negative impact on environmental policy in Korea. As the crisis unfolded, economic recovery efforts forced budget reductions in many policy areas, including the environment. Although these cutbacks were temporary, the change in the attitudes of policy makers towards environmental issues prevailed well afterwards. Analysis of environmental budget trends after 1997 showed that spending on the environment grew much more slowly than before the financial crisis. This is evidence of the decline in priority of environmental issues during this period.

I began my analysis by briefly describing the changes in environmental policy in Korea beginning in the late 1980s and continuing until the financial crisis. In particular, I noted that environmental regulations and measures were expanded and strengthened considerably in the early 1990s. Improvements in many areas of the environment were realized in Korea in the years leading up to the crisis because these expanded policies were backed by sizable increases to the environmental budgets.

In Section 3 and 4, I examined pollution control and abatement (PAC) expenditures in the public and business sector before and after the financial crisis. From the analysis, I demonstrated that the trend in spending on PAC activities had slowed and became more erratic after the financial crisis. A temporary reduction in spending is a reasonable response to an economic crisis, but a prolonged slowdown implies that factors other than the crisis are effecting a change in pollution abatement and control activities, i.e. a change in policy priority. Business PAC spending exhibited a similar pattern in its growth rates. Since pollution abatement and control activities are highly regulated in Korea, this suggests that policy makers permitted

businesses to subordinate environmental clean-up and protection activities. It was noted that the government had even lifted and relaxed a majority of environmental regulations to accommodate the demands of the private sector after the financial crisis.

In section 5, I examined the total environmental budget for Korea, breaking it down into its two main components – the budget for the Ministry of Environment and the budget for Water Quality Improvement. The MOE budget essentially stagnated after the crisis and the total environmental budget managed to continue growing after the crisis only because of hefty infusions by the government for Water Quality Improvement spending. During this period, however, spending in other budget areas of the government increased steadily. As the lead agency for all matters relating to the environment, the lack of sizable budgetary increases for the MOE considerably limited the organizational and coordination capacity of the agency. This is especially significant in the late 1990s as Korea was attempting to move towards sustainable development policies.

Lastly, I reviewed the state of the environment in Korea after 1997 in section 6. The evidence further supported my position regarding the change in the importance of environmental policy. With respect to some common environmental indicators, Korea's record did not improve much after the financial crisis. Air quality had improved appreciably from the late 1980s, but then leveled off after the financial crisis. In the case of total suspended particulates, the concentration of pollutants in the atmosphere even worsened slightly. Water quality also remained roughly constant during this period. It is clear from these examples that spending on the environment after the crisis had been inadequate for further improving environmental quality in Korea. These are the consequences of the change in priority of environmental policy.

It should be noted that the shift in policy was subtle; it was not pronounced with a drastic measure, such as a rollback of environmental budgets or the repeal of environmental legislation. Such bold initiatives were not politically feasible, especially since the majority of Koreans continue to rank the environment as a top priority even after the financial crisis. In fact, policy makers continued to publicly support the expansion of environmental protection and the promotion of sustainable development after the crisis. A quick review of press releases by the Ministry of Environment bears this out. However, the lack of financial commitment to the environment in the form of adequate budget increases implies otherwise.

In the midst of the financial crisis, policy makers were understandably very concerned about the state of the economy. After the crisis had passed, however, policy makers continued to act on the assumption that the economy was unstable even though Korea's economy continued to expand each year from 1999 to 2003. The need to balance the environment and development, which had been gaining wider understanding and acceptance in policy circles in the early 1990s, yielded to the "needs" of economic growth. Thus, the financial crisis created the conditions, i.e. economic uncertainty, within which policy makers reestablished the preeminence of economic development in public policy. Spending on economic development continued to increase throughout this entire period, echoing the "growth first" policy that had driven economic development in Korea for decades.

Implications

There are a number of implications that arise from the results of this paper. First, inadequate funding of the environment may delay the achievement of environmental goals. Slow annual budget increases will necessarily slow the

expansion of environmental activities. Additionally, it may result in competition between different policies, forcing compromises that further hinder expedient environmental results. These potential delays may prove crucial, especially as to the impact of environmental pollution on peoples' health. A clean and healthy environment is not just an idyllic notion of nature. It relates to tangible issues, such as public health. Hampering pollution clean up may correspond to greater public health consequences due to longer or more intense exposure to health hazards. This translates into economic costs because of greater health care costs and time lost from work.

Second, lowering environmental priority because of a national crisis sets a bad policy precedent. Policy makers who are forced to make similarly difficult decisions in the future between the environment and the economy will repeatedly choose development without regarding the trade off in or actual costs of such reactive policy making. This bias in favor of economic growth essentially shackles environmental policy to GDP in an era when most policy makers recognize the necessity of balancing development and the environment. While Korea can more easily recover from such actions, developing countries that choose to abandon environmental policy may incur irreparable losses; for example, Indonesia's burning of tropical forests in 1997 for increasing palm oil exports.

Lastly, the shift in environmental policy portends poorly for Korea's policy towards Type III pollutants, such as CO_2 and NO_x emissions, which are rapidly becoming a problem regionally and globally. Addressing these issues will require making some difficult and potentially economically painful choices, at least in the short run, in order to decouple emissions growth from economic growth. In the case of CO_2, Korean policy makers have already indicated that Korea may be unable or

unwilling to implement reductions because it will result in a competitive disadvantage for Korea in the global economy. This despite the fact the Korea has already ratified the Kyoto Protocol.[40] In the case of NO_x, curbing emissions will require an overhaul of Korea's transportation policy, one that slows the growth in the number of private automobiles on the road each year.

Although importance of the environment has given ground to development in Korea, it is possible for the balance to shift back. It was the strength of the environmental movement that initially forced Korean officials to adopt a strong stance on the environment. Therefore, advocacy and continued vigilance can again bolster current environmental policy. The lessons of the financial crisis serve as warning about the danger of poor policy choices coming from good intentions. Economic development is important. But, quality of life is more than just a measure of a country's GDP or the median income of its citizens; it includes other important considerations, among which is a clean environment.

Further Research

This paper adds to the discussion on sustainable development, which is predicated on balancing development and the environment. The results of this paper demonstrate that such a balance can be tenuous, even in a relatively wealthy country like Korea. Future studies may want to focus on specific environmental policies around the period of the financial crisis. When data about individual project budgets becomes available, an analysis of the implementation of policies, actual versus planned, can yield valuable information about Korea's commitment to the environment. It would be interesting to determine the degree to which delays in

[40] Nesirky, Martin and Kim, Jack. "Kyoto Protocol Tough for Emerging Economies," online, PlanetArk - Reuters, 29 Mar. 2005.

achieving environmental goals after the financial crisis are attributed to policy interferences. Analysis of budgets between environmental media can provide information about the decision making process by which policy makers implemented budget changes. This can establish whether environmental budget changes were based on the relative importance and urgency of an environmental issue or whether the changes were based on regionalism or other political reasons.

Korea was not a poor, developing country when the financial crisis struck. And yet, policy makers revealed their bias against the environment when the economic situation of the country seemed uncertain. Such prejudices within policy circles need to be fully addressed if the concept of sustainable development is to be fully integrated into national development decision making in Korea. As stated earlier, difficult decisions regarding trade-offs between the environment and the economy will abound, but for Korea to truly move towards an environmentally-friendly society, then commitments to the environment must be just as strong as those to development. Otherwise there is no guarantee that policy makers will maintain environmental priorities during times of crisis.

APPENDICES

APPENDIX A: ENVIRONMENTAL LEGISLATION

Table A1.
Major Environmental Legislation, Republic of Korea

Legislation	Legislated	Amended
Basic Environmental Policy Act	1 Aug 1990	31 Dec 1999
Environmental Impact Assessment Act on Environment, Transportation and Natural Disaster	31 Dec 1999	
Act Relating to Environmental Technology Support and Development		3 Feb 2000 (Wholly)
Environmental Dispute and Settlement Act		28 Aug 1997
Act Relating to Environmental Improvement Charges	31 Dec 1991	8 Feb 1999
Act Relating to Special Accounting for Environmental Improvement	5 Jan 1994	30 Dec 1996
Act Relating to Punishment for Environmental Crime		31 Dec 1999
Environmental Management Corporation Act	21 May 1983	27 Dec 1993
Natural Environment Preservation Act	31Dec 1991	3 Aug 1994, 1997, 2001
Natural Park Act	4 Jan 1980	28 Mar 2001
Wetland Preservation Act	8 Feb 1999	
Act Relating to Protection of Birds, Mammals and Hunting		30 Dec 1983, 1999
Special Act on the Ecosystem Preservation of Island such as Dokdo Island	13 Dec 1997	
Soil Environment Preservation Act	5 Jan 1995	28 Mar 2001
Air Quality Preservation Act	1 Aug 1990	28 Aug 1997, 1999
Water Quality Preservation Act	1 Aug 1990	27Jan 2001
Noise and Vibration Control Act	1 Aug 1990	7 Mar 1997
Act Relating to Water Resources Management in Han River and Community Supply	8 Feb 1999	16 Jan 2001
Act Relating to the Treatment of Sewage, Night Soil and Livestock Wastewater	8 Mar 1991	8 Feb 1999
Sewerage System Act	3 Aug 1966	28 Mar 2001
Drinking Water Management Act		31 Dec 1999
Waste Management Act		31 Dec 1999
Act Relating to Promotion of Resources Saving and Reutilization	8 Dec 1992	8 Feb 1999
Act Relating for Promotion of Waste Treatment Facilities and Local Community	8 Dec 1992	8 Feb 2001
Act Relating to Transboudary Movement of Waste and Their Disposal	8 Dec 1992	16 Jan 2001
Act Relating to Establishment and Operation of Sudokwon Landfill Management Corporation	21 Jan 2000	
Toxic Chemicals Control Act		30 Dec1996, 1999

Legislation	Legislated	Amended
Korea Resource Recover and Reutilization Corporation Act	27 Dec 1993	
Environmental Impact Assessment Act	11 June 1993	7 Mar 1997
Special Act on Nakdong River's Watershed Management	7 Dec 2001	
Special Act on Geum River's Watershed Management	7 Dec 2001	
Special Act on Yeongsan and Seomjin River's Watershed Management	7 Dec 2001	

Source: UNEP, Country Profile Report, Republic of Korea available at <http://www.rrcap.unep.org/country/cp/easia/cp_ROKorea.cfm>

APPENDIX B: POLLUTION DATA

Table B1.
Average Annual Concentration of Sulphur Dioxide (SO_2) by Major City, 1985 - 2003
Unit: parts per million (ppm)

	1985	1986	1987	1988	1989	1990	1991	1992
Seoul	0.056	0.054	0.056	0.062	0.056	0.051	0.043	0.035
Busan	0.047	0.042	0.039	0.044	0.047	0.039	0.038	0.033
Daegu	0.039	0.043	0.055	0.052	0.048	0.041	0.041	0.040
Inchon	0.052	0.053	0.056	0.056	0.065	0.044	0.041	0.036
Gwangju	0.020	0.02	0.014	0.019	0.021	0.017	0.017	0.017
Daejeon	0.033	0.027	0.026	0.034	0.035	0.029	0.028	0.022
Ulsan	0.030	0.032	0.027	0.028	0.026	0.027	0.035	0.033

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Seoul	0.023	0.019	0.017	0.013	0.011	0.008	0.007	0.006	0.005	0.005	0.005
Busan	0.028	0.023	0.023	0.022	0.018	0.015	0.014	0.01	0.008	0.007	0.006
Daegu	0.035	0.038	0.031	0.023	0.016	0.014	0.011	0.009	0.008	0.006	0.006
Inchon	0.021	0.022	0.023	0.012	0.013	0.009	0.008	0.008	0.007	0.006	0.007
Gwangju	0.014	0.013	0.010	0.008	0.009	0.008	0.007	0.006	0.004	0.004	0.004
Daejeon	0.020	0.021	0.017	0.015	0.011	0.009	0.009	0.007	0.006	0.004	0.004
Ulsan	0.032	0.031	0.028	0.022	0.019	0.015	0.017	0.013	0.012	0.01	0.011

Source: National Statistical Office, Republic of Korea

Table B2.
Annual Average Concentration of Heavy Metal (Pb) in the Atmosphere by Major City, 1991 - 2003
Unit: micrograms per cubic meter ($\mu g/m^3$)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Seoul	0.3408	0.2860	0.2090	0.1907	0.1844	0.1495	0.1088	0.0936	0.0984	0.0825	0.0743	0.0832	0.0584
Busan	0.2471	0.1408	0.1759	0.1438	0.0705	0.1023	0.0829	0.1096	0.1030	0.1004	0.0698	0.0751	0.0512
Daegu	0.1379	0.1078	0.0476	0.0439	0.0138	0.0315	0.0302	0.0358	0.0367	0.0269	0.0515	0.0698	0.0576
Inchon	0.4270	0.3947	0.2588	0.2455	0.2427	0.2160	0.1704	0.1256	0.1263	0.1203	0.1290	0.1059	0.1213
Gwangju	0.1183	0.0870	0.0536	0.0470	0.0487	0.0442	0.0331	0.0089	0.0086	0.0435	0.0347	0.0331	0.0310
Daejeon	0.1573	0.1433	0.2573	0.2761	0.3666	0.1405	0.1806	0.0885	0.0990	0.0806	0.0595	0.0482	0.0457
Ulsan	0.1043	0.0905	0.0866	0.0826	0.0457	0.0662	0.0688	0.0703	0.0663	0.0673	0.0565	0.0678	0.0565
Yeosu	0.0540	0.0569	0.0342	0.0318	0.0420	0.0293	0.0154	0.0015	0.0022	0.0281	0.0280	0.0352	0.0174
Pohang	0.0848	0.0760	0.0619	0.0568	0.0289	0.0244	0.0305	0.0454	0.0466	0.0393	0.0768	0.0806	0.0720

Source: National Statistical Office, Republic of Korea

Table B3.
Average Annual Concentration of Suspended Particulate Matter (PM-10) by Major City, 1995 - 2003
Unit: micrograms per cubic meter ($\mu g/m^3$)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Seoul	-	-	78	72	68	59	66	65	71	76	69
Busan	-	-	73	76	68	67	65	62	60	69	55
Daegu	-	-	81	87	72	72	66	63	67	71	59
Inchon	-	-	76	67	70	57	53	53	52	57	61
Gwangju	-	-	49	51	49	49	56	58	57	52	36
Daejeon	-	-	63	63	69	58	55	51	48	53	43
Ulsan	-	-	69	51	43	29	29	52	53	54	40

Source: National Statistical Office, Republic of Korea

APPENDIX C: AIR QUALITY GUIDELINES

Table C1.
Guidelines for Annual Ambient Air Concentration of Various Pollutants

Pollutant	MOE	WHO
Sulphur dioxide (SO_2)	(Before 2001) Yearly avg < 0.03 ppm (After 2001) Yearly avg < 0.02 ppm 24-hour avg <0.05 ppm 1-hour avg <0.15 ppm	 Yearly avg < 100 µg/m3 24-hour avg < 250 µg/m3 (Note: 1 ppm = 2860 µg/m3)
Suspended particulate matter (PM_{10})	(Before 2001) Yearly avg < 80 µg/m3 (After 2001) Yearly avg < 70 µg/m3 24-hour avg < 150 µg/m3	None
Lead (Pb)	(Before 2001) 3-month avg < 1.5 µg/m3 (After 2001) Yearly avg < 0.5 µg/m3	 Yearly avg < 0.5 µg/m3
Nitrogen dioxide (NO_2)	Yearly avg < 0.05 ppm 24-hour avg < 0.08 ppm 1-hour avg < 0.15 ppm	Yearly avg < 40 µg/m3 1-hour avg < 200 µg/m3 (Note: 1 ppm = 1880 µg/m3)
Carbon Monoxide (CO)	8-hour avg < 9 ppm 1-hour avg < 25 ppm	8-hour avg < 10,000 µg/m3 1-hour avg < 30,000 µg/m3 (Note: 1 ppm = 1,145 µg/m3)
Ozone (O_3)	8-hour avg < 0.06 ppm 1-hour avg < 0.1 ppm	8-hour avg < 120 µg/m3 (Note: 1 ppm = 2000 µg/m3)

Source: Ministry of Environment, Republic of Korea; World Health Organization

APPENDIX D: WATER QUALITY GUIDELINES

Table D1.
Grade Level Index of Rivers and Streams
Unit: mg/L

Grade Level	pH	BOD	Suspended Solids	Dissolved Oxygen
I	6.5 ~ 8.5	< 1	< 25	Above 7.5
II	6.5 ~ 8.5	< 3	< 25	Above 5
III	6.5 ~ 8.5	< 6	< 25	Above 5
IV	6.0 ~ 8.5	< 8	< 100	Above 2
V	6.0 ~ 8.5	< 10	No floating trash	Above 2

Source: *Green Korea 2004*, Ministry of Environment, Republic of Korea

APPENDIX E: PUBLIC SECTOR PAC EXPENDITURE

Table E1.
Pollution Abatement and Control (PAC) Expenditure: PUBLIC SECTOR
Unit: 100 million Korean won (1995)

Year		Waste water	Waste	Air	Other	TOTAL	% Change
1993	Investment expenditure	10827	2566	24	72	13488	n/a
+	Internal current expenditure	2076	5696	204	437	8413	n/a
–	Receipts from by-products	..	12	..	..	12	
=	**Expenditure 1**	**12903**	**8250**	**228**	**509**	**21889**	n/a
1994	Investment expenditure	11670	3038	44	127	14879	10.31%
+	Internal current expenditure	2827	6575	257	464	10123	20.32%
–	Receipts from by-products	..	15	..	..	15	
=	**Expenditure 1**	**14497**	**9598**	**301**	**590**	**24986**	**14.15%**
1995	Investment expenditure	13393	3554	42	326	17315	16.38%
+	Internal current expenditure	3823	7395	262	560	12040	18.94%
–	Receipts from by-products	..	75	..	..	75	
=	**Expenditure 1**	**17216**	**10874**	**304**	**886**	**29280**	**17.19%**
1996	Investment expenditure	14980	3703	91	287	19063	10.10%
+	Internal current expenditure	3969	8189	251	547	12958	7.62%
–	Receipts from by-products	..	50	..	..	50	
=	**Expenditure 1**	**18949**	**11843**	**343**	**834**	**31971**	**9.19%**
1997	Investment expenditure	20503	3862	90	311	24767	29.92%
+	Internal current expenditure	4200	9162	246	565	14175	9.39%
–	Receipts from by-products	..	50	..	..	50	
=	**Expenditure 1**	**24703**	**12974**	**337**	**876**	**38892**	**21.65%**
1998	Investment expenditure	15219	4613	96	253	20182	-18.51%
+	Internal current expenditure	3951	9211	238	548	13949	-1.59%
–	Receipts from by-products	..	63	..	..	63	
=	**Expenditure 1**	**19170**	**13760**	**334**	**802**	**34067**	**-12.41%**

Table E1. (cont.)
Pollution Abatement and Control (PAC) Expenditure: PUBLIC SECTOR (cont.)
Unit: 100 million Korean won (1995)

Year			Waste water	Waste	Air	Other	TOTAL	% Change
1999		Investment expenditure	17214	4919	88	230	22453	11.25%
	+	Internal current expenditure	4178	10025	236	543	14984	7.42%
	–	Receipts from by-products	..	71	..	..	71	
	=	**Expenditure 1**	**21393**	**14872**	**325**	**774**	**37365**	**9.68%**
2000		Investment expenditure	16427	2588	451	156	19623	-12.60%
	+	Internal current expenditure	3938	10301	212	551	15003	0.13%
	–	Receipts from by-products	..	72	..	..	72	
	=	**Expenditure 1**	**20365**	**12816**	**663**	**708**	**34554**	**-7.52%**
2001		Investment expenditure	17747	3452	220	226	21645	10.31%
	+	Internal current expenditure	2964	10269	315	1225	14774	-1.52%
	–	Receipts from by-products	..	328	..	..	328	
	=	**Expenditure 1**	**20711**	**13393**	***535***	**1451**	**36091**	**4.45%**
2002		Investment expenditure	18129	3474	67	214	21883	1.10%
	+	Internal current expenditure	3276	10533	360	1414	15583	5.48%
	–	Receipts from by-products	..	333	..	..	333	
	=	**Expenditure 1**	**21406**	**13693**	***427***	**1628**	**37154**	**2.95%**
2003		Investment expenditure	18479	4185	52	256	22972	4.98%
	+	Internal current expenditure	3848	10766	478	1555	16648	6.83%
	–	Receipts from by-products	..	333	..	..	333	
	=	**Expenditure 1**	**22327**	**14618**	***530***	**1811**	**39286**	**5.74%**

Source for 1993 – 1994, 2001 – 2003: Bank of Korea
Source for 1995 – 2000: OECD. *Pollution Abatement and Control Expenditure in OECD Countries*. Paris, France: OECD, 2003.

Table E2.
Annual Growth of PAC Expenditure, 1994 – 1997: PUBLIC SECTOR

Year	Waste water	Waste	Air	Other	Total
1994	12.4%	16.4%	31.9%	16.0%	14.2%
1995	18.8%	13.3%	1.2%	50.1%	17.2%
1996	10.1%	8.9%	12.8%	5.9%	9.2%
1997	30.4%	9.6%	-1.8%	5.0%	21.6%
Sub-Total (1993 – 1997)	**91.5%**	**57.3%**	**48.0%**	**72.1%**	**77.7%**
Annual Average	**17.6%**	**12.0%**	**10.3%**	**14.5%**	**15.5%**

Source: OECD; Bank of Korea

Table E3.
Annual Growth of PAC Expenditure, 1999 – 2003: PUBLIC SECTOR

Year	Waste water	Waste	Air	Other	Total
1999	11.6%	8.1%	-2.7%	-3.5%	9.7%
2000	-4.8%	-13.8%	104.0%	-8.5%	-7.5%
2001	1.7%	4.5%	-19.3%	105.0%	4.5%
2002	3.4%	2.2%	-20.2%	12.2%	3.0%
2003	4.3%	6.8%	24.1%	11.2%	5.7%
Sub-Total (1999 – 2003)	**4.4%**	**-1.7%**	**63.1%**	**134.0%**	**5.1%**
Annual Average	**1.1%**	**-0.4%**	**13.0%**	**23.7%**	**1.3%**

Source: OECD; Bank of Korea

APPENDIX F: BUSINESS SECTOR PAC EXPENDITURE

Table F1.
Pollution Abatement and Control (PAC) Expenditure: BUSINESS SECTOR
Unit: 100 million Korean won (1995)

Year		Waste water	Waste	Air	Other	TOTAL	% Change
1993	Investment expenditure	2.500	1.461	3.782	547	8.290	n/a
+	Internal current expenditure	3,668	4,178	2,532	734	11,112	n/a
–	Receipts from by-products	..	..	..	..	..	
=	**Expenditure 1**	**6,168**	**5.639**	**6,314**	**1,281**	**19,401**	n/a
1994	Investment expenditure	3,386	2,057	4,528	1,269	11,240	35.6%
+	Internal current expenditure	4,326	5,066	3,105	724	13,221	19.0%
–	Receipts from by-products	..	..	..	..	..	
=	**Expenditure 1**	**7,712**	**7,123**	**7,634**	**1,992**	**24,461**	**26.1%**
1995	Investment expenditure	4,760	2,685	5,403	1,141	13,989	24.5%
+	Internal current expenditure	5,543	5,653	3,786	830	15,792	19.5%
–	Receipts from by-products	..	117	..	..	117	
=	**Expenditure 1**	**10,303**	**8,221**	**9,169**	**1,971**	**29,664**	**21.3%**
1996	Investment expenditure	5,285	3,336	5,097	1,060	14,779	5.7%
+	Internal current expenditure	5,912	6,533	4,128	840	17,414	10.3%
–	Receipts from by-products	..	115	..	..	115	
=	**Expenditure 1**	**11,197**	**9,755**	**9,225**	**1,900**	**32,079**	**8.1%**
1997	Investment expenditure	3,645	2,344	7,356	624	13,971	-5.5%
+	Internal current expenditure	5,981	7,408	4,462	878	18,730	7.6%
–	Receipts from by-products	..	146	..	..	146	
=	**Expenditure 1**	**9,627**	**9,609**	**11,879**	**1502**	**32,555**	**1.5%**
1998	Investment expenditure	2483	1564	4258	572	8878	-36.5%
+	Internal current expenditure	5353	6296	3993	819	16462	-12.1%
–	Receipts from by-products	..	138	..	..	138	
=	**Expenditure 1**	**7836**	**7722**	**8251**	**1391**	**25201**	**-22.6%**

Table F1. (cont.)
Pollution Abatement and Control (PAC) Expenditure: BUSINESS SECTOR (cont.)
Unit: 100 million Korean won (1995)

Year		Waste water	Waste	Air	Other	TOTAL	% Change
1999	Investment expenditure	2,094	1,488	5,959	572	10,114	13.9%
	+ Internal current expenditure	6,422	7,365	4,839	1,109	19,736	19.9%
	– Receipts from by-products	..	171	..	..	171	
	= **Expenditure 1**	**8,516**	**8,682**	**10,798**	**1,682**	**29,680**	**17.8%**
2000	Investment expenditure	2,189	1,833	3,652	554	8,230	-18.6%
	+ Internal current expenditure	7,265	8,807	6,282	1,166	23,522	19.2%
	– Receipts from by-products	..	190	..	..	190	
	= **Expenditure 1**	**9,455**	**10,450**	**9,935**	**1,727**	**31,562**	**6.3%**
2001	Investment expenditure	4,497	1,056	6,103	487	12,143	47.5%
	+ Internal current expenditure	6,457	3,176	7,887	1,019	18,539	-21.2%
	– Receipts from by-products	88	2,512	167	22	2,789	
	= **Expenditure 1**	**11,042**	**6,744**	**14,157**	**1,528**	**33,470**	**6.1%**
2002	Investment expenditure	5,681	1,171	7,488	498	14,838	22.2%
	+ Internal current expenditure	6,668	3,161	8,099	987	18,915	2.0%
	– Receipts from by-products	102	2,843	279	55	3,219	
	= **Expenditure 1**	**12,451**	**7,175**	**15,806**	**,1540**	**36,972**	**10.5%**
2003	Investment expenditure	5,060	1,247	7,615	612	14,534	-2.1%
	+ Internal current expenditure	6,729	4,267	8,026	1,090	20,112	6.3%
	– Receipts from by-products	113	3,774	232	36	4,156	
	= **Expenditure 1**	**11,902**	**9,288**	**15,874**	**1,737**	**38,802**	**5.0%**

Source for 1993 – 1994, 2001 – 2003: Bank of Korea
Source for 1995 – 2000: OECD. *Pollution Abatement and Control Expenditure in OECD Countries*. Paris, France: OECD, 2003.

Table F2.
Annual Growth of PAC Expenditure, 1994 – 1997: BUSINESS SECTOR

Year	Waste water	Waste	Air	Other	Total
1994	25.0%	26.3%	19.7%	132%	35.6%
1995	33.6%	15.4%	20.1%	-1.1%	21.3%
1996	837%	18.7%	0.6%	-3.6%	8.14%
1997	-14.0%	-1.5%	28.1%	-21.0%	1.5%
Sub-Total (1993 – 1997)	**56.1%**	**70.4%**	**87.2%**	**17.3%**	**67.8%**
Annual Average	**11.8%**	**14.3%**	**17.0%**	**4.1%**	**13.8%**

Source: OECD; Bank of Korea

Table F3.
Annual Growth of PAC Expenditure, 1999 – 2003: BUSINESS SECTOR

Year	Waste water	Waste	Air	Other	Total
1999	8.7%	12.4%	30.9%	20.9%	17.8%
2000	11.0%	20.4%	-8.0%	2.3%	6.3%
2001	16.8%	-35.5%	42.5%	-11.2%	6.1%
2002	12.8%	6.4%	11.7%	0.8%	10.5%
2003	-4.4%	29.5%	0.4%	12.8%	5.0%
Sub-Total (1999 – 2003)	**39.8%**	**70.4%**	**47.0%**	**3.3%**	**30.7%**
Annual Average	**8.7%**	**7.0%**	**10.1%**	**0.8%**	**6.9%**

Source: OECD; Bank of Korea

APPENDIX G: BUDGET DATA

Table G1.
Environmental Budget: South Korea
Unit: 100 million Korean won (1995)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
MOE Budget	1,887	4,716	6,729	8,851	10,802	11,131	11,536	13,023	14,143	14,336	14,036
Allowance for Water Quality Improvement	2,500	2,490	3,121	3,978	6,867	6,132	6,714	9,317	12,250	14,293	15,837
Total (Environmental Budget)	4,387	7,206	9,850	12,829	17,669	17,263	18,250	22,340	26,393	28,629	29,873

Source: Ministry of Environment, Republic of Korea

Table G2.
Korea Government General Account: 1993 - 2004
Unit: 100 million Korean won (1995)

	1993	1994	1995	1996	1997	1998
(1) Nat'l Defense Expenditures	101,681	105,818	113,676	123,373	124,593	120,205
(2) Education Expenditures	82,130	86,107	97,380	105,121	110,125	102,966
(3) Social Development	37,933	40,325	41,632	47,854	53,834	61,147
(4) Economic Development	85,447	103,178	115,069	125,069	148,576	188,354
(5) General Administration	49,456	49,741	54,530	59,875	62,253	62,002
(6) Grants to Local Government	48,491	49,839	54,842	60,784	62,042	59,748
(7) Repayment of Debt & Others	3,696	3,420	10,256	3,453	3,722	4,482
(8) Other Expenditures	4,942	8,697	27,595	31,828	18,542	22,629

	1999	2000	2001	2002	2003	2004
(1) Nat'l Defense Expenditures	117,159	124,172	127,942	133,962	136,471	143,222
(2) Education Expenditures	96,132	104,163	141,370	144,173	154,347	159,548
(3) Social Development	77,461	86,865	107,646	106,603	111,769	115,969
(4) Economic Development	197,846	190,551	201,692	246,334	225,752	213,320
(5) General Administration	65,768	66,845	72,710	78,058	93,700	82,304
(6) Grants to Local Government	56,500	68,020	97,226	94,384	111,130	102,472
(7) Repayment of Debt & Others	14,585	38,890	32,045	35,042	43,168	36,919
(8) Other Expenditures	52,390	51,092	11,210	16,648	4,111	2,779

Source: Ministry of Planning and Budget, Republic of Korea

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