

# Environmental Governance for Sustainable Development in East Asia\*

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East Asia has enjoyed rapid industrialization during these two decades. However, some of them have suffered from environmental degradation locally, and others done from regional and global environmental degradation. Green growth and related concepts have been invented to overcome the trade-off between economic growth and environmental conservation. But is it enough for realizing sustainable development in East Asia? This article makes critical review of the Environmental Kuznets Curve (EKC) hypothesis to show its role in the development of environmental economics. Then it examines economic mechanism that promote environmental degradation locally and globally to indicate what hinders environmental governance for sustainable development in East Asia.

**Keywords:** sustainable development, Environmental Kuznets Curve, environmental governance, East Asia

**JEL Classification Numbers:** 01, 05

## 1. Introduction

East Asia has enjoyed rapid economic growth for more than a decade through export-oriented economy and policy. However, rapid economic growth has caused serious environmental degradation. Sustainable development is urgently required in this region to continue economic development within the carrying capacity of

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both the region and the earth, with due consideration to the well-being of all the people, including the poor. Sustainable development requires policy integration, especially integration of economic and environmental policies in order to transform the current economic structure and lifestyle that has accelerated “mass production, mass consumption and mass waste.” It also requires informed participation of multi-stakeholders in the decision making process of planning, checking and reforming policies so that the government meet the needs of and keep accountability to the people.

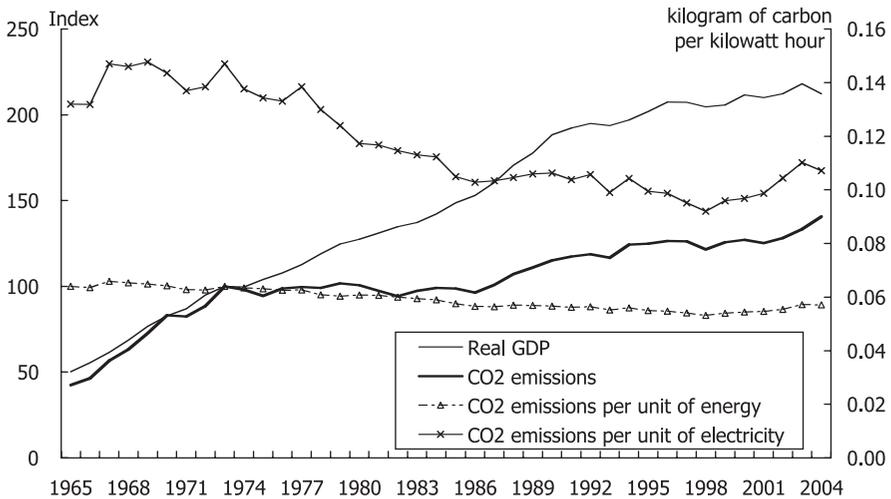
The environment and economy in East Asia are experiencing dramatic changes. The most important thing to realize is sustainable development in the East Asian region, and contributions to the sustainable development of the world as a whole through the sustainable development of East Asia. From this viewpoint, we should examine theory and reality on how the environmental conservation is considered and integrated into economic growth in East Asia. Additionally, we should also clarify the relationship between these issues and sustainability at a global level. Elucidating these subjects is, in other words, to clarify the relationship between green growth and sustainable development.

Complete answers cannot be provided to these questions at present. In the following part of this paper, the challenges to the realization of sustainable development will be considered by critically investigating and discussing the Environmental Kuznets Curve and environmental governance. Firstly, we review the discussion over Environmental Kuznets Curve hypothesis to clarify factors and conditions this hypothesis holds true. Then, showing economic mechanisms that cause environmental degradations in East Asia, we show that environmental governance has been increasingly important in realizing sustainable development in East Asia. Finally we discuss desirable environmental governance within a country as well as in region.

## **2. Does Economic Growth Mitigate Environmental Degradation? Critical Review of Environmental Kuznets Curve Hypothesis**

One of the important steps toward green growth is to delink the relationship between economic growth and environmental degradation. The Environmental Kuznets Curve (EKC) hypothesis offers a explanation for the delinking: it claims that there exists an inverted U-shaped relationship between a variety of indicators of environmental pollution or resource depletion and the level of per capita income. It suggests that economic growth will take care of the environment automatically, despite at the expense of immediate and long-term losses in environmental assets.

The EKC hypothesis explains delinking of economic growth and environmental degradation by the five factors (de Bruyn and Heintz, 1999): (a) increase in marginal benefit that consumer can enjoy from good environment, and their changes in consumption activities and preferences. This may affect firms’ production activities. (b) institutional and policy changes. This is often supported by voting, though is



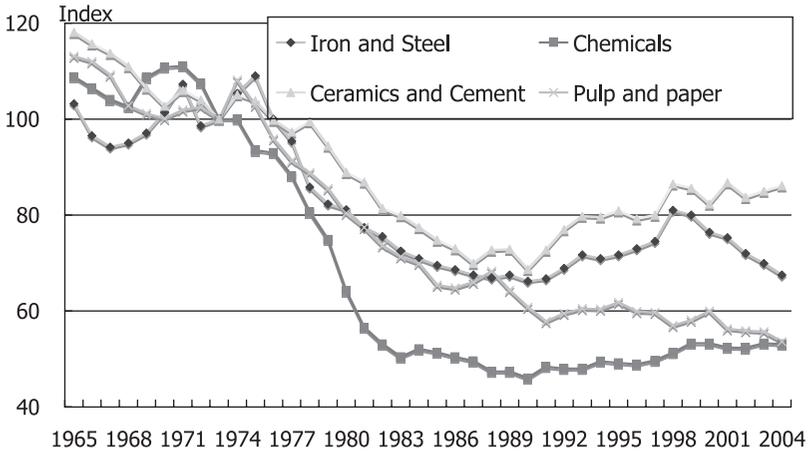
**Figure 1** Delinkage and relinkage of GDP and CO<sub>2</sub> emission in Japan, 1971–2004.

Note: 1973 = 100 for real GDP, CO<sub>2</sub> emissions, CO<sub>2</sub> emissions per unit of energy.

Data Source: Institute of Energy Economics, 2006. *Handbook of Energy and Economics Statistics in Japan 2006*.

susceptible to lobbying activities by business. (c) increase in environmental efficiency through technological and organizational changes. This is often backed by increased capital stock. (d) structural changes in the economic sector, from agricultural, industrial sector to service sector. (e) international relocation.

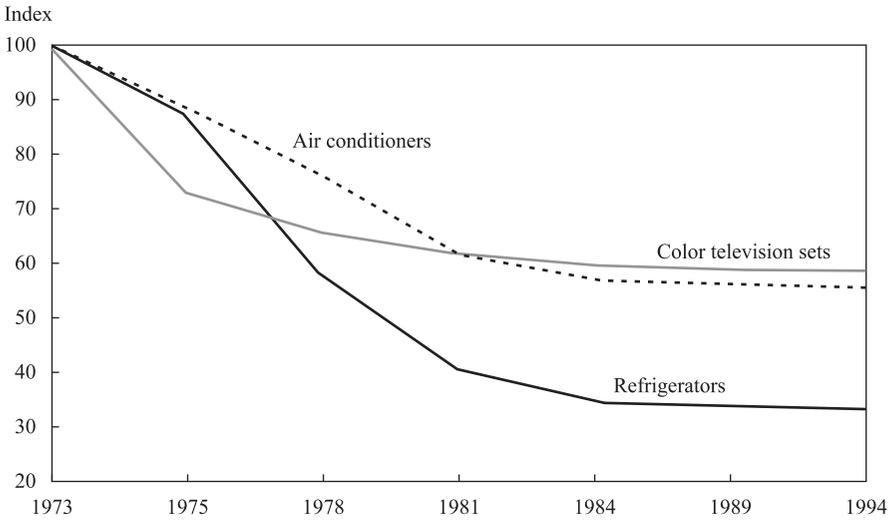
Empirical studies suggest that turning point comes at per capita income between US\$ 3,000–10,700 for sulfur dioxide, and between US\$ 3,280–9,600 for suspended matters (Shafik, 1994; Grossman and Krueger, 1995). Country-specific studies find that industrialized countries had delinked the relationship between economic growth and environmental degradation when they tackled with industrial pollution. For example, Japan succeeded in delinking the relationship between GDP growth and increase in pollutants emission. It achieved an 82% decrease in sulfur dioxide and 22% reduction in nitrogen dioxide emission from 1970 to 1992, while it enjoyed GDP growth by 140%. It also delinked the relationship between GDP growth and increase in CO<sub>2</sub> emission in the late 1970s and 1980s (Fig. 1). Delinking has been realized mostly by end-of-pipe technology, cleaner production, improvement of ecological efficiency of production patterns, and technological progress. Manufacturing sector, including such pollution-intensive industries as iron and steel, pulp and paper, chemicals, and ceramics and cement improved energy efficiency in the production process between 1974 and late 1980s (Fig. 2). Energy efficiency of electric and electronics products has also improved significantly (Fig. 3). It had suffered from industrial pollution during 1950s and 1960s. But behind these firms' efforts were there fierce pressure to industrial pollution



**Figure 2** Energy intensity by industry in Japan (IIP Basis), 1970–2004.

Note: 1973 = 100

Data source: Same as Figure 1.

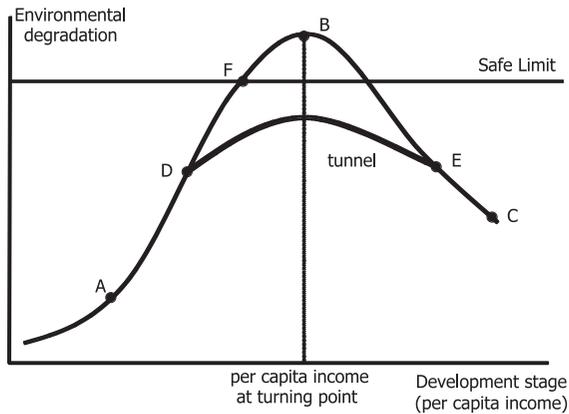


**Figure 3** Energy efficiency improvements in Japanese home appliances, 1973–94.

Note 1: 1973 = 100

Note 2: Due to scaling up of the products, no consistent data is available after 1994.

Data source: Same as Figure 1.



**Figure 4** Environmental Kuznets Curve and “Tunnel Cut”.

Source: Munasinghe (1999).

from local residents and corresponding policy change at local and national government, as well as upsurge of crude oil price. These studies provides a counterevidence to the Club of Rome’s “Limits to Growth” that predicts shortage of food and resources and fall into catastrophe in near future.

Developing countries can potentially “advantage of backwardness” in environmental policy in the early stage of economic development to avoid serious pollution that industrialized countries had gone through: they can obtain more accurate scientific information on the relationship between pollutants and environmental impacts; they can adopt less pollution and less resource-intensive technology and production process that industrialized countries have developed, and reduce pollutant and waste discharge; they can learn experiences of environmental policy, institutions and management, and make land use planning and establish investment location policy to promote location of less pollution-intensive industries (O’Conner, 1994). Munasinghe (1999) insists environmental policy such as raising subsidies resource prices closer to the long-run marginal cost, imposition of pollution charge, and establishment of better-defined property rights will improve the environment at a lower income level. Dasgupta et al. (2002) suggests economic liberalization and public disclosure of firms’ pollutants discharge are also beneficial to improve the environment. These policy measures can help developing countries to build a tunnel in the EKC if they are taken with special care to be timing and sequencing (Fig. 4).

Three types of critiques have been made to the EKC: (a) econometric method to the EKC, (b) explanatory power of the factors, and (c) range of environmental pollution and pollutants that EKC can explain.

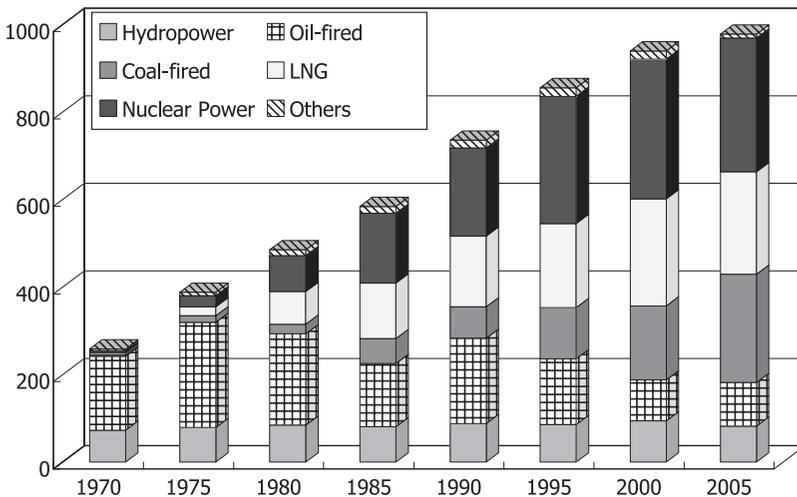
Regarding econometric method, reliability of the empirical results is fragile for most of the research (Stern, 2004). Empirical studies that include additional

explanatory variables do not report cointegration or other statistics that might tell us if omitted variables bias is likely to be a problem or not; higher turning points are found for regressions that used purchasing power parity adjusted income; including more low-income data points in the sample might yield a higher turning point. Stern (2004) concludes given the poor statistical properties of the most EKC models, it is hard to come to any conclusions about the roles of other additional variables, and that too few studies have been done of other indicators apart from air pollution to come to any firm conclusion.

Turning to explanatory variables, recent studies offer little support for the view that economic growth alone is the solution to all environmental problems. There is no established agreement as to the explanatory power of each driving force. Most contingent valuation studies have found an income elasticity of demand for environmental services smaller than unity (Kristrom and Riera, 1996). This is especially true for a society that has low literacy rate and whose educational level is not high, and for pollutant that would appear after several years of accumulation. Policy change, or environmental policy change has often been made after civil society's movement toward democratization had become fierce. South Korea and Taiwan, as well as Central and Eastern Europe shows good examples how environmental movements has raised democratization movement, and democratization has brought creation of institutions for environment. However, there has found no agreeable empirical evidences that explain the relationship between democracy and the environmental improvement (Torras and Boyce, 1998). Technological and organizational changes are keys driving force for raising environmental efficiency, but are realized only for pollutants that cost-effective technologies exist or are developed. In addition, environmental efficiency has been often offset by production and consumption growth as well as scaling up of product size. This results in an N-shaped curve. Figure 1 shows Japan has gone through re-linking of the relationship between real GDP and CO<sub>2</sub> after the year 1990 even though Japanese power companies have reduced CO<sub>2</sub> emissions per unit of generated electricity.

Finally, the EKCs can apply only for few indicators of environmental pollution that can be solved technologically and whose adverse impacts are well documented and well known. Shafik (1994) suggested that meaningful EKCs exist only for local pollutants such as concentration of BOD, TSP and SO<sub>2</sub>, among the ten environmental indicators listed in the World Bank Development Report 1992. Many empirical analysis have clarified that EKCs can be relevant only for pollution measures such as local air and water quality and health damages, while no ecological efficiency measures of environmental sustainability such as biodiversity, land use, reduction of air and water pollution among the twenty-one indicators that consists of the Environmental Sustainability Index (Cole et al. 1997; Lee, Chung and Koo, this volume). In addition, pollution-income relationship from cross-country data could not predict accurate trends in air and water quality in a single country study of Malaysia (Vincent, 1997). This implies the EKCs do not guarantee that any developing countries will improve the environment even when they go beyond the turning point.

Moreover, local air and water quality might have been improved at the expense of international or inter-regional relocation and displacement of these pollutants to other substances. This often happens when firms prefer end-of-pipe solutions: fuel-gas desulfurization can remove most of the SO<sub>2</sub> emission, while produces fly ash that will be disposed as industrial waste. Wastewater treatment plants clean up the water at the expense of generation of sludge that should be carefully disposed because it includes heavy metals. This signifies aggregate waste, represented as solid waste and CO<sub>2</sub> emission, is still high and per capita waste may not have declined. Also, SO<sub>2</sub> and NO<sub>2</sub> emissions may be reduced when coal-fired thermal plant is replaced to nuclear power plant, while the latter generates radioactive waste and brings higher environmental risk to people nearby. As shown in Figure 5, Japan has increased its energy reliance on nuclear power and liquefied natural gas (LNG). This was a response to fulfil two purposes at the same time: reduction of air pollution from thermal power plants, and satisfaction of increasing demand for electricity<sup>1)</sup>. Global environmental sustainability cannot be ensured if the relocation and displacement can explain much of the environmental improvement in industrialized countries.



**Figure 5** Electricity generation by energy source, 1970–2005 (Billion kWh).

Note: LPG includes other gases and geothermal and bituminous materials.

Data source: Same of Figure 1.

<sup>1)</sup> Figure 4 shows that electricity supply from coal-fired thermal power plant has increased since 1980. Economic growth has increased electricity demand, drop in energy price gave disincentives for conservation efforts, and liberalization of electricity market has prompted coal use for supplying cheaper electricity.

This comes to the most critical issue of the EKC hypothesis: even if economic growth may be associated with improvement of some environmental indicators, they do not imply that the Earth's resource base is capable of supporting indefinite economic growth (Arrow et al., 1995). The Earth's resource base, or ecosystem resilience is irreversible once degraded or lost. The loss of ecosystem resilience will cause discontinuous change in ecosystem function, irreversible change in the set of options open to present and future generation, and increase the uncertainties associated with the environmental effects of economic activities.

These changes tend to affect most adversely to the poor in developing countries due to their heavy reliance on environmental resources. They are incapable of living in the same condition once they lose environmental resources. They may adapt to the adverse impact if they obtain high literacy, enough knowledge on the sustainable use of environmental assets. To mitigate the adverse impacts and enhance their well-being, however, socio-economic mechanism of the cause and effects should be clarified.

### **3. Economic Mechanisms of Environmental Degradation in East Asia**

The environmental problems in East Asia in the 21st century are emerging with a new quality while the economy and technology are undergoing evolution. This trend is led by regional economic integration through international movement of capital, that is, globalization of the world economy. The global environmental problems since the second half of the 1980s emerged partly due to the globalization. Environmental problems have also changed qualitatively in that they cause adverse effects on a regional scale. Thus we cannot understand the economic mechanism correctly and clarify policy and institutions to manage global and regional environmental problems unless the complex interdependence between the regional and global economies is analyzed. Sustainable development cannot be achieved globally without realizing sustainable society that is endorsed by regional environmental policies. To realize sustainable society, it is precondition that environmental right rule should be incorporated into market and global economic system on a global scale. This raises re-examination of the current network between environmental activities and environmental policies at a local-regional, national and global economic level.

East Asia has suffered from a variety of environmental degradation. At least several problems can be viewed as an emergence of global environmental problems caused by the global economic system. The Environment Agency of Japan (currently Ministry of Environment) has taken up nine phenomena as global environmental problems, namely, (a) depletion of the ozone layer, (b) global warming, (c) acid rain, (d) decreases in tropical forests, (e) desertification, (f) pollution problems of developing countries, (g) decreases of biodiversity, (h) ocean pollution and (i) trans-boundary movement of hazardous waste. This classification is useful in understanding scientific nature of these issues and finding out

technical measures to tackle with them. However, it provides little knowledge on how to manage the environment amid globalization. Economic mechanisms should be clarified to understand root cause of the environmental degradation.

In view of economic mechanism, environmental degradation can be classified as five types (Ueta, 1991). The first one is region-wide transboundary environmental pollution caused by an expansion in economic activities in some areas. Transboundary acid rain and water pollution of international rivers are typical examples. These are the cases where scaling up of economic activities in some countries increases pollutants emissions, and causes environmental damage in other countries. To tackle with this type of problem, it is the first step to scientifically identify the relationship between cause and effect, or in other terms, between emission and damage. Inspection of emission sources, disclosure of emission inventory, and transboundary monitoring system are essential to obtain scientific evidence on the relationship. However, it cannot be expected that polluting countries unilaterally take such actions, let alone pollution abatement investment or preventive measures when they put least priority on environmental issues, and/or they concern exclusively on domestic environmental problems: measures for domestic environmental problems do not always mitigate transboundary environmental problems<sup>2)</sup>. An international rule should be established to solve this type of problem.

Polluter-pays-principle (PPP) can be a rule to solve this type of environmental problems, for it was effective in managing local pollution in industrialized countries. However, PPP cannot necessarily be applied at any occasion, especially when developing countries are major polluters and industrialized ones are victims. Developing countries usually cannot afford to pay abatement costs to manage region-wide pollution problems, even if they also suffer from local pollution. An example is damage from acid rain in Japan and South Korea. It is estimated that increasing amount of sulfur is coming from China to Japan and South Korea, though the contribution to deposition is varied by estimation (Table 1). This is caused by rapid industrialization in China. Marginal abatement cost and the optimal level of SO<sub>2</sub> emission reduction are much lower in China than in Japan. However, China has less incentive to manage acid rain than local air pollution, while it has introduced more stringent environmental regulations. Assuming that the developing countries have the right for development, China can claim it does not have to pay all the abatement cost. In this case, beneficiary pays principle may be considered for the reason that industrialized countries can avoid environmental damages that might have suffered from (Nakada and Ueta, 2007).

The second type is environmental degradation caused by foreign direct investment (FDI), or so called “pollution haven” hypothesis. It posits that difference in environmental regulations influence firm or industrial level location decisions. There are two variants of the hypothesis. The “industrial flight” variant suggests that pollution-intensive “dirty” industries will flee the relatively higher costs of

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<sup>2)</sup> Higher chimney can increase acid rain and reinforce the environmental damages at remote areas even if it reduces ones at local level.

**Table 1** Estimated contribution to sulfur deposition in Japan (%) (1990)

Model	Sources of Deposition			
	Japan	Volcanoes	China	Korean Peninsula
Ichikawa et al. (1995)	40	18	25	16
Ikeda et al. (1995)	37	28	25	10
Carmichael et al. (1995)	38	45	10	7
Huang et al. (1994)		94	3	2
Chinese Academy of Science (1995)		85	10	4
Calori et al. (2001) (note)	38	9	40	13

Note: This estimation is for the year 1995.

Source: Mori et al. (2008).

environmental compliance in industrialized countries to relocate to developing countries where compliance costs are lower. A typical example is a Japanese company that relocated to establish joint company to refine rare earth in Malaysia. It was suspected to abandon radioactive waste and was sentenced to suspend operation by the Ipoh Higher Court in 1992. Official development assistance (ODA) was also blamed for triggering industrial flight of dirty industries and for ignoring adverse environmental and social impacts of development projects, using different environmental regulations as an excuse.

The other variant emphasizes that developing countries use low or lax environmental standards to attract FDI. This will promote rapid growth of dirty industries in unregulated countries. This may trigger race to the bottom in some cases. Mani and Wheeler (1998) employs data on international trade flows and shows pollution haven might have happened in Japan and Southeast Asia in the 1970s: Japan decreased output of pollution intensive industries as a percentage of total manufacturing and its export-import ratio while Southeast Asia increased it.

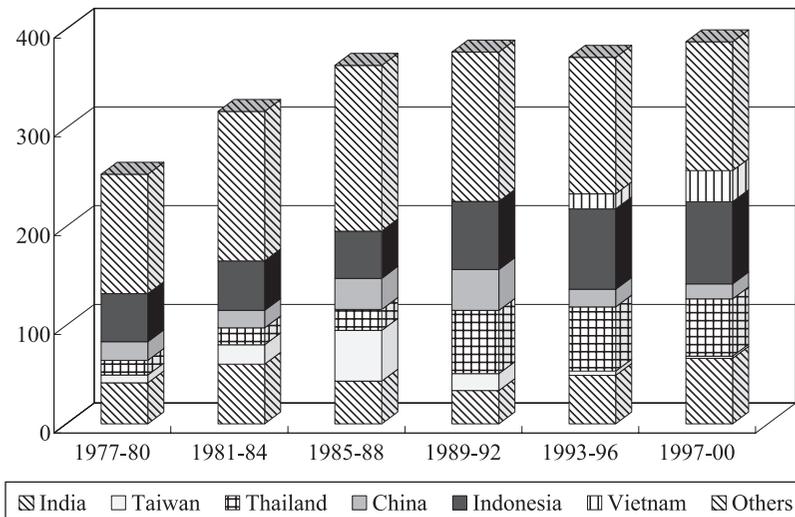
It is host country government that should be responsible for this type of problem. Recently, many developing countries have enacted stringent environmental laws and regulations. It is no longer correct to say that environmental standards in the developing countries are less stringent than those in the industrialized countries. However, they have rarely enforced it stringently due to lack of administrative capacity and resources, which leaves the problems unsolved. In addition, they tend to allocate much government expenditure to economic infrastructure than social and environmental ones. This biased government expenditure has accelerated environmental degradation. Distribution of surpluses gained from economic growth should be changed so that government revenue is spent to develop capacity for implementing environmental policies. For developing countries to take effective policy instruments, it is indispensable to disseminate the past experience of pollution and pollution control in the industrialized and developing countries correctly, besides transferring environmental conservation

technologies.

It is pointed out that FDI and aid agencies should also be responsible for the problem. Progress can be seen in harmonizing environmental and social guidelines among aid agencies, as well as between domestic and foreign investment in industrialized countries. Almost all the aid agencies have set up such guidelines, and some of them established inspection panel or ombudsman to confirm the compliance to the guidelines and to mitigate environmental and social conflicts and damages that are caused by aid-financed projects. Recently, the range of application has been widened to export credit financing and trade insurances.

The third type is environmental degradation triggered by international division of labor. Most of East Asia countries have changed economic development policy from inward-oriented to export-oriented strategy. This has promoted rapid industrialization and commercialization of agricultural products. Trade liberalization has often increased price of tradable commodities and has expanded intensive farming of cash crop.

A typical example is shrimp farming. Japanese consume shrimp four times larger now than 30 years ago, and rely 86% of the consumption on imports. It amounts to one third of the total amount of shrimp import in the world. Accordingly, Southeast Asia has replaced traditional extensive farming to intensive farming, which is expected to grow up shrimp much more efficiently. Intensive farming has been expanded from coastal area to inland, and from Taiwan and Thailand to India and Vietnam (Fig. 6). However, intensive farming has caused various kinds of environmental degradation: mangrove forest has been destroyed,



**Figure 6** Trends of shrimp import in Japan, 1977–2000 (JPY billion).

Data source: Ministry of Finance, *Japan International Trade Monthly*.

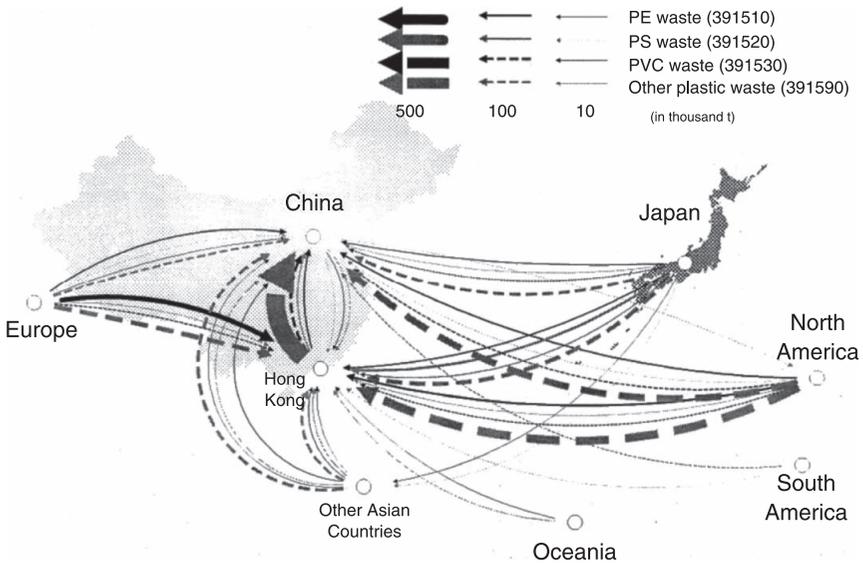
which causes damages from floods and loss of biodiversity in coastal areas (Barbier and Sathirathai, 2004). Groundwater pumping up causes land subsidence around the farm. Wastewater damages nearby agricultural and orchard land because it contains salt and many kinds of chemicals.

There prevail many technical measures to prevent environmental degradation. However, farmers have little incentive to take them because they hardly forward the prevention cost to the production price amid severer international competition under trade liberalization. Farmers tend to ignore environmental costs until they face severer enforcement of environmental regulations, or international pressure for conservation.

Thus viewed, the primary industry can easily turns into environmental destructive activities when it is integrated into export-oriented policy, even if it is traditionally friendly to local environment. Unsustainable economic structure and lifestyle in industrialized countries accelerated this environmentally destructive process.

To fundamentally solve this type of problem, developing countries should establish policies and institutions to ensure farmers incorporate resources and environmental conservation costs. Industrialized countries should also change economic structure, consumption pattern and lifestyle. This includes new international economic order that replaces current international division of labor.

Also, many East Asia and the Pacific countries have suffered from rising



**Figure 7** Material flow of waste plastic in East Asia in 2002.  
 Note: Volume of flow more than 5000t per year.  
 Source: Yoshida (2004).

pollution intensity of economic structure. They had comparative advantage in the labor-intensive sector such as textile in the early stages of economic development and have gained advantage in steel and chemical industries, all of which are resource and pollution intensive. The government often attracted such industries by developing industrial estate and providing preferential treatment. This has caused serious industrial pollution there.

Transboundary movement of hazardous waste is basically caused by the same economic mechanism. Several countries have suffered from this problem despite of the effectuation of the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and Their Disposal. The movement has been made not only from industrialized countries to East Asia, but also among this region. This has prompted by increased transboundary movement of recyclable goods and materials (Fig. 7). There are pushing and pulling factors. Globalization has promoted international division of labor in East Asia, and has increased production and trade of goods and services in the region. Some countries face domestic resource and goods scarcity, and should rely on import of second-hand goods and recyclable materials to meet increasing domestic demands. Other countries, such as Japan, South Korea and Taiwan, have legislated recycling laws and regulations, and require extended producer responsibility to manufacturing firms, but face lack of domestic demands for recycled materials, because many manufacturing and recycling plants have been relocated abroad. Even if they have plants in their home countries, they are suffering from expensive recycling costs, and have strong incentives to export recyclables.

The fourth type is poverty-environmental degradation trap. This problem is most serious in the Sub-Saharan region where desertification has accelerated famine and has emerged environmental refugees who are forced to destroy the environment. This mechanism is prominent in many of regions where rain forests are depleted, land is devastated and ecosystem is collapsing through accelerated desertification, partly caused by the accumulated international debt. Concentrated landholdings and monoculture economy prompted the poor to extend agricultural land for cash crops, which accelerated deforestation.

Several Washington-based non-governmental organizations (NGOs) conducted debt-for-nature swap (DNS) to help developing countries to solve this problem. Some aid agencies also conducted it on a large scale. However, large scale DNS has been criticized for worsening livelihood of local people. Tobin tax is proposed to change the rapid movement of international capital flow. This proposal is not easy to realize, however, for it accompanies fundamental change of global economic system. So international aid is gradually changing current practices to focus more on local and community-based management of regional common-pool resources (Mori and Ueta, 2008).

The fifth type is degradation of global commons caused by collective actions on a global scale. Examples are ozone layer depletion by chlorofluorocarbon and climate change caused by greenhouse gases (GHGs) emission. This type is featured by indirectness of the relationship between polluters and victims: all the

people including polluters will ultimately be victims of destruction of global commons while they do not suffer for the time being. This is a new problem in that human activities have reached a level that exceeds carrying capacity of the Earth. This type of problem poses challenge on how to ensure equity between North and South, and between current and future generation, as is evident from recent international negotiation on climate change policy.

All these five types of global environmental problems have their own features. Policy instruments and constraints in implementation also differ. Furthermore, current global environmental problems are featured by mixture and interactions of these five types of the problems. For example, environmental resources exploitation by intensive export promotion (type 3) changes lifestyle and industrial activities into environmentally destructive (type 4). In any case, it is unavoidable to reform current global economic system when realizing social and economic system for sustainable development. It should be reminded that all these environmental problems give adverse impact locally, while current global economic system often hamper any efforts to transform the economic mechanism of such environmental problems.

#### 4. Concluding Remark

During recent one and half decade, argument of environmental economics has turned its argument from the trade-off of economic growth and environmental protection toward green growth. The EKC implies green growth can be realized by more economic growth, for the latter changes consumer preference, policy and institutional response, technological and organizational behavior, industrial structure and firm's location strategy. However, green growth is relevant only where economy is growing: Some countries or locals in East Asia suffer from decreasing income and growing income gap instead of economic growth. In addition, green growth cannot automatically realize sustainable development. Economic mechanisms, policy and institutional arrangements that work better for the environment are essential so that economic growth will contribute to sustainable development. This article makes critical review of the EKC hypothesis as a challenge of going beyond green growth debates to environmental governance for sustainable development. This implies theoretical and empirical research should be developed on multi-level environmental governance to discuss how to go beyond the limitation of green growth in realizing sustainable development.

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