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Environment and development: the prospective for early- and late-developed countries

Abstract

In this study, the mainstreaming of ecological and environmental concepts between "early-developed" (or developed) and "more recently developed" (or "late-developed") countries are primarily considered, while the "developing" countries are also recognized. The authors propose that the countries represented by these two categories interpret and hence treat ecology, the environment and development differently. For example, early-developed countries favor the concept of specific area, or disciplinary ecology, such as wilderness, recreation, watershed, products, parks, etc. In contrast, late-developed countries favor the concept of development program, or interdisciplinary ecology. The formation and evolution of these two environmental concepts is founded on different economic, social, historical, and contemporary conditions. Hence, late-developed countries should implement measures to promote the development of a sustainable economy, society, and eco-environment in view of the parameters that "compound" these issues in late-developed countries to complete rapid industrialization and modernization.

Keywords: disciplinary ecology, interdisciplinary ecology, early-developed countries, late-developed countries.
JEL Classification: A19, A13, F01, O10, P59, Q01.

Introduction

Environment and development serves as a national strategy that guides countries' development and management decisions and resource allocation and utilization, primarily targeting on social equity, economic growth, resource efficiency and environmental friendliness for sustainability. It varies in countries with different backgrounds, resources and social systems (Gladwin, 1977). The integration of environment and development has been thoroughly translated in the context of ecosystem and ecology (Haeckel, 1866; Tansley, 1935), in which the concept of mankind has been expanded continuously in social ecology (Bookchin, 1971), industrial ecology (Ayres, 1972), urban ecology (MAB Report, 1984) and economic ecology (Rothschild, 1990). These disciplinary ecology theories inspected the relationships between nature and socio-economic standings based on the early-developed countries' background. Studies from perspective of the late-developed countries such as China were conducted by Chinese scholars in concept of complex ecosystems of society, economy and nature (Ma and Wang, 1984), and basic concept and structural functions of social ecology (Ye, 1998, 2001). The quantitative analysis of coordinated development of population, resources, economy and environment was explored by Mao (1995), Feng et al. (1997) and Wei et al. (2002), while coordinated development of economy and ecology in the west of China was discussed by Nie (2002). All these studies, however, have not come into a comprehensive and systemic overview of both early-developed and late-developed countries in eco-environmental treatment concepts. Hence, the authors of this paper attempt to look into the differences, looking for a basic idea in treating eco-environmental problems in late-developed countries at given historical conditions.

The Copenhagen Summit concluded on December 19, 2009 with the non-legally binding "Copenhagen Accord", which was based on negotiations among representatives of 26 countries. However, the summit revealed distinct differences between developed and developing countries in solving eco-environmental problems. Each category of countries, in defining and promoting the perspective of environment and development in coordinating their needs and deeds, integrate principles, values, and practices of sustainable development into all aspects of their own, making effort encourages changes in behavior that will create a more sustainable future in terms of environmental integrity, economic viability, and a justice society for present and future generations. For example, the Group of 77 (i.e. the 1964 signatories of 77 developing countries) seriously protested against the Denmark Draft Bill, while the African Group (the regional group of 53 countries) accused the developed countries of suppressing the Kyoto Protocol, and the Basic Five Countries (or BRICS[1]) held a common position on climate negotiations. However, the summit was not the first effort towards international cooperation on eco-environmental protection and sustainable development. In fact, the United Nations Conference on the Human Environment held in 1972, and *Our Common Future* from

[1] The Basic Five Countries (or BRICS) refer to Brazil, Russia, India, China and the more recently joined South Africa on December 28, 2010.

the United Nations report published in 1987, introduced these issues as the consensus of mankind. Yet, 40 years later divergences still exist, leading to the question of what the underlying subjective understanding and objective conditions of the different countries is. It is possible to understand this problem when it is restricted to the framework of the relationship between mankind and nature, or the relationships inside human social system. Hence, economic and social factors require consideration to attain a feasible answer for the divergence in a comprehensive world view.

The following scenarios represent the worst cases that form the basis of the conflicting world views between early-developed, late-developed, and developing countries. Basically, the existence of early-developed countries is no longer dependent on their own natural resources. For these countries, such as Denmark and the USA with the most competitive world economies (World Economic Forum, 2006), the environment is represented by a pleasant park to walk in, and the purchase of supermarket food shipped in from across the globe (Phillips, 2006). For developed countries, over-eating and obesity is a major, even life-threatening, problem at the population level (Seidell, 1996). Developed countries use a myriad of forest-derived products, from toilet paper to furniture to houses. In fact, developed countries consume far more natural resources than developing countries (Hart, 1997), yet their thinking is insulated from their natural resource base. In contrast, developing countries, with food supply shortage and undernourishment (FAO, 2001), are primarily driven by economic survival, and tend to view their natural resources in terms of their own economic benefit. Eco-environmental problems are basically the negative products of industrial civilization, which are generated through the human pursuit of modernization. This pursuit resulted in the classification of countries into early-developed and late-developed, based on the sequence of events leading to modernization. Early-developed countries refer to the developed countries of today, while all other countries belong to the categories of late-developed and the developing countries. These categories are differentiated into eco-environmental problem types and consequent treatment.

Scientists have primarily investigated eco-environmental problems based on the social and historical conditions of early-developed countries, with limited consideration being given to late-developed countries. However, it is not possible for developing countries to directly replicate the methods used to solve eco-environmental problems by early-developed countries. This is because to solve eco-environmental problems, a reasonable explanation for the value orientation of different stakeholders is required, in addition to correctly understand the relationship between human and nature by using proper basic principles and norms. Otherwise, replication is likely to result in a dilemma between eco-environmental treatment and international cooperation for late-developed countries, due to the absence of necessary economic and social foundations. Accordingly, in this study, the authors examine the differences and fundamental causes underlying eco-environmental treatment by early-developed countries and late-developed countries. Based on these evaluations, the authors propose a basic theory to address eco-environmental problems in late-developed countries.

1. Disciplinary ecology: concepts of treating eco-environmental issues by early-developed countries

1.1. Treatment process of eco-environmental issues by early-developed countries. The treatment of eco-environmental issues by early-developed countries is notably characterized by gradualness, which is reflected in the arrangement that the path and goal are treated. Early-developed countries follow a "treatment after pollution" path once industrialization has led to the objective of the economy and social development. This achievement enables early-developed countries to take full benefit from the "first-mover advantage" at that time. For example, at the turn of the 20th century, early-developed countries were at the beginning of modernization, with comparatively loose constraints in resources and the environment. Energy and natural resources (such as oil, coal, land, timber, and fresh water reserves) were maximally used to develop the domestic economy of these countries. The consequent enormous material wealth led to humans not giving accompanying ecological damage appropriate consideration until the "Eight Social Pollution Nuisances"[1] took place in the industrialized countries from the 1930s to the 1960s, and the publication of the "*Silent Spring*" by Rachel Carson in 1962. As eco-environmental problems became increasingly serious in early-developed countries, ecological and environmental protection began to enter the mainstream of social consciousness of early-developed countries, and drew worldwide concern. It was for-

[1] The "Eight Social Pollution Nuisances" refer to the major environmental disasters of the world caused by industrial pollution in the 20th century, which included: the Smog Event in Masi River Vale of Belgium (1930), Donora Smog Disaster in the USA (1948), Photochemical Pollution Event in Los Angeles (1940s), London Smog Event (1952), Minamata Bay Mercury Pollution Event in Japan (1953-1956), Toyama Event in Japan (1955-1972), Yokkaichi Event in Japan (1961), Rice Bran Oil Event in Japan (1968), Cuyahoga river fire in Cleveland, Ohio (1969).

tunate that the early-developed countries had entered a post-industrial stage, with a solid economic and social foundation, as well as necessary material and technical means for the treatment of eco-environmental issues. One distinguishing feature of post-industrial society is that service sector substitutes the manufacturing sector in dominating the economy, while knowledge and technology dominate the input of production instead of traditional resources. This development substantially reduces the extent material and energy use in the process of production and consumption, as well as damage to the eco-environment.

With respect to the goal of eco-environmental treatment, the early-developed countries targeted types of ecological and environmental problems that were closely related to the process of industrialization and urbanization. Industrialization led to industrial pollution, which stressed the eco-environment. However, industrialization also drove the development of urbanization, which in turn led to the issues of urban pollution. As eco-environmental problems, such as climate change, acid rain, ozone depletion, biodiversity loss, and ocean pollution, expanded from urban to regional areas, cross-border issues further escalated global issues. The industrialization and urbanization of early-developed countries has been gradually advancing over the last hundred years, with the goals of ecological and environmental treatment continually evolving. Therefore, early-developed countries have had sufficient time, material and technological conditions to prepare for the control of different types of ecological and environment problems at different stages of expertise, which is another important reason why "treatment after pollution" is applicable. For example, mining, textile, and steel manufacturing, in addition to the petrochemical industry, were the industries with the most pollution in Japan during the early stage of industrialization from the Meiji era (i.e., since 1896) to the 1960s. Hence, the 1970s was the period for the control of industrial pollution in Japan. In the 1980s, Japan's environmental investment was focused on urban environmental infrastructure. In the 1990s, climate change, acid rain, ozone layer protection, biodiversity, and other international and regional environmental issues became the important agenda of environmental protection in Japan. Since the end of the 1990s, the solution to waste-disposal problems caused by consumer society has become a prominent issue.

In early-developed countries, peoples' perception of the relationship between man and nature also reflects the "progressive" evolution of eco-environmental treatment. These perceptions lie in the ecological ethics and ecological aesthetics that develop from Anthropocentrism to Naturalism. As a product of the human pursuit of modernization in early-developed countries, Anthropocentrism assesses the practice of eco-environmental treatment by adopting an exclusively human perspective[1]. This status was maintained until the 1960s and 1970s, when the eco-environmental crisis resulting from industrialization prompted people to profoundly rethink the concept of Anthropocentrism. As a result, the consequent environmental protection movement led to a transition of mainstreaming environmental ethics from Anthropocentrism to Naturalism. The emergence of democracy was an important factor, as it allowed these issues to be discussed without suppression for economic and geopolitical reasons. Naturalism has several theoretical branches[2], but as a whole it promotes the overall interests and value of nature, and considers the role of material production resulting in the serious damage of the ecological environment. Naturalism increases the fundamental human perception of the ecological environment in economic and social activities. The ultimate goal of this concept is to stress the integrity, balance and stability of the natural environment and human ecosystem. The ecological aesthetics of early-developed countries also pays more attention to the aesthetic state of ecological balance between humans and nature. Within this framework the natural environment is pursued, yet concern is lacking about relations between humans and society. For example, the concept of "wilderness protection" that was advocated by Muir (1990) reflects an emotion in seeking the spirits and values that were discarded in the age of industrial civilization. However, the roots may also be overly patriotic, which basically equates civilization with degradation and exalts in the primal and often brutal past, such as the case in Nazi Germany.

2.2. Treatment concept of eco-environment issues by early-developed countries. Hence, the evolution of eco-environmental treatment and the basic feature of values in early-developed countries have led to the concept of specific area, or disciplinary ecology.

[1] Anthropocentrism may be divided into a traditional and modern stage. Traditional anthropocentrism had a profound ideological basis in the early period of Greek philosophy (6th BC), with the inception of anthropocentrism being seen from Aristotle's natural teleology to Plato's theory of ideas. Anthropocentrism was also enhanced by Judaism, Christianity, and Islam, and has been further demonstrated since modern times with the rise of humanism and the development of natural science in early-developed countries. Descartes, Bacon, Kant and Hegel established the authority of human rationality from different perspectives. Modern anthropocentrism, whose representatives include Norton, Murdy, Passmore, and McCloskey, still stresses the priority of human beings in nature, although it has been premised with humans protecting the eco-environment.

[2] Branches of Naturalism include: Leopold's Land Ethic (1933), Singer's Animal Liberation (1975) and Regen's Animal Rights (1996), Taylor's Biocentrism (1986), Naess's Deep Ecology (1973) and Rolston's Natural Value Theory (1983).

Disciplinary ecology focuses on the relationship between man and nature, and highlights the rights of nature to purposely maintain the integrity, balance, stability, and beauty of natural ecology. It stresses the priority of eco-environmental protection in policy orientation, and argues for unified international ecological and environmental protection standards led by early-developed countries in international cooperation. The high input cost is targeted towards attaining high benefits from the manner in which the ecological environment is treated. At this point, industrialization is considered as a technical basis, rather than holding a leading position.

Disciplinary ecology is gradually shaped during development of a country from modernization to post-modernization, and from industrial society to post-industrial society, with a developed economy and society being a prerequisite. The concept of disciplinary ecology is consistent with the ecological environmental protection of postmodern society. Disciplinary ecology promotes the use of dematerialized and greening technologies, which represent the development trend of production technology. Hence, disciplinary ecology is not an applicable theoretic model to late-developed countries. The discrepancy owes to different social and historical conditions towards modernization between late-developed countries and early developed-countries in eco-environmental treatment. For example, Zeng (2007) stated, "the environmental imaginations of Ethiopia's poor and American middle-class white are quite distinct from each other: the former's anxiety is where breakfast of tomorrow is, while the latter may be concerned about whether wildflowers will bloom again tomorrow". Guha (1989), an Indian scholar, challenged the concept of "wilderness protection", arguing that "wilderness protection" would result in environmental injustice in view of the economic and social reality of India. It reveals that the reality of the socio-economy is an important element in examining the conceptual differences in the treatment of the eco-environment between late-developed countries and early-developed countries.

2. Particularity of eco-environmental issues in late-developed countries

2.1. Basic demand of late-developed countries and compressed industrialization. Unlike the modernization process realized by early-developed countries, that of late-developed countries is revealed by the on-going pursuit of modernization, which determines the basic necessity of rapid development by late-developed countries. Development is the primary task, and determines fundamental living rights. Primary concerns are the elimination of poverty, consistent food supply and employment. Poverty also has a significant effect on the ecological environment, as a major source of social problems arising in late-developed countries. Late-developed countries must rely on natural resources for survival, because of the low level of productivity. However, over exploitation and misuse of natural resources leads to serious damage of the eco-environment. In the 50 years following World War II there has been about two billion hectares of land degradation, within which 80% is located in Asia, Africa, and Latin America (Oldeman, 1990).

To eliminate poverty and accelerate development, the late-developed countries have generally implemented industrialization. Industrialization is the basic means to realize modernization and increase productivity. The formation and development of other forms of modern civilization, such as urbanization, automation, market orientation, democratization, rationalization, and globalization are all associated with the process of industrialization. Thus, although the damage of industrialization to the ecology and environment has been exposed, new improved methods are needed.

The effective exploitation at minimal cost to the eco-environment lies in the sustainable management of natural resources. However, until the completion of modernization, industrialization remains a necessary method for late-developed countries. In fact, the practice of curbing industrialization to protect the ecology and environment may lead to poverty, which in turn causes further degradation of the ecology and environment. Dasgupta (1993) analyzed this mechanism, and found that the deceleration of industrialization and urbanization would result in the loss of jobs by large numbers of urban residents, who would then turn to agriculture, which would lead to a sharp increase in the agricultural population. This increased population would have to cultivate fragile land, which would result in severe soil loss. Moreover, over-harvesting and grazing would further increase ecological deterioration, and result in a vicious circle.

Therefore, late-developed countries generally adopt development acceleration to tackle environmental problems. These countries anticipate that rapid economic growth may provide the necessary material and technical basis for tackling environmental problems. To achieve rapid growth, the industrialization process of late-developed countries has been significantly shortened from hundreds of years to decades, resulting in what has been termed "compressed industrialization" (O'Conner, 1994). This process has brought about rapid growth, in parallel to an acceleration and accumulation in the degradation of ecology and the environment. The social structure and

eco-environmental system have not been able to adapt to the rapid growth of productivity in such a short time. In addition, the large scale introduction of technology from the early development countries could produce "non-endogenity", which is not consistent with the requirement for the short-term development of society and ecology of late-developed countries. Furthermore, increasing demographic density, due to the improvement of sanitation, has aggravated per capita pollution. The production and consumption of pollution intensive products has consequently been much higher than that of early-developed countries in the period of early industrialization (Islam, 1997). Generally speaking, the features of "compressed industrialization" have fundamentally determined that the late-developed countries face more serious eco-environmental crises.

2.2. Environmental justice: prospective for late-developed countries. Moreover, the late-developed countries in the industrialization process have had to face the new challenge of post-modern society, owing to globalization led by early-developed countries. The post-modern society requires "ecologization", the concept of which requests for the reduction in the density of materials and energy consumption. Ecologization represents the deceleration of economic growth to protect the balance and integrity of the ecology and environment, in addition to the promotion of unified ecological environmental protection rules for all countries to follow. In this scenario, the emphasis of international constraints for late-developed countries involves environmental justice.

First, the early-developed countries emphasize the giving-up of current economic interests, to protect the ecology and environment for the benefit of future generations, which is termed intergenerational justice. Intergenerational justice is both reasonable and feasible for early-developed countries, based on their sound economic foundation. Yet, for late-developed countries, economic development is viewed as a requirement that cannot be compromised, as any stagnation of economic growth will generate immediate social problems (Tharamangalam, 1998). Food supply and employment of contemporary people must be properly handled first. This standpoint is termed intra-generation justice. The gap between inter-generational justice and intra-generation justice is unavoidable between countries at different stages of modernization.

Second, the early-developed countries promote unified international ecological and environmental protection rules for all countries to comply with. However, the process of pursuing modernization is quite different in late-developed countries. The former had comparatively loose international space, within which a large number of resources could be imported, as well as being able to relocate more polluting industries to late-developed countries, whose environmental management was previously less strict to avoid the high costs for environmental protection. Hence, late-developed countries became what were termed "pollution heavens" (Baumol and Oates, 1988). An empirical analysis by Mani and Wheeler (1998) using data from 1960 to 1995 found that the Organization for Economic Co-operation and Development (OECD) countries, Japan, and North American countries had sought "pollution heavens" during particular periods, and hence exported a proportion of their pollution. Sha and Shi (2006) evaluated the panel data from 1999 to 2004, and found that the Foreign Direct Investment enterprises in China had significant negative effects on the ecology and environment. The early-developed countries had occupied the space advantage of international ecological resources. The late-developed countries therefore had to confront a narrower space of international ecological resources under the pressure of protecting the ecology and environment in the age of post-industrialization. Hence, while these two types of countries are on one planet, they operate in two completely different worlds. A Chinese Taiwan scholar lamented that there was no common future (Chi, 1998) between countries of different levels of modernization.

2.3. Complexity of eco-environmental problems in late-developed countries. The diachronic contradictions in the process of modernization became synchronic contradictions in late-developed countries, due to compression. These factors determined the "compound" feature of eco-environmental problems, which was entirely different from the "gradualness" feature of early-developed countries. First, the eco-environmental problem in early-developed countries arose following industrialization, when entering the age of post-industrialization. The sound economic and social conditions facilitated the organization/development of a gradual solution. In late-developed countries, eco-environmental problems have been serious since the middle, and even the early, stage of industrialization, which greatly restricted the process of industrialization. However, as the dominant mode to realize modernization, industrialization could not possibly be relinquished in late-developed countries. In addition, social problems, such as inequality and interest polarization, that accompanied economic development, also disturbed late-developed countries. Thus, late-developed countries had to confront the issues of economic development, social stability and eco-environmental protection, which are closely interlinked in the process of modernization. In turn, this made eco-

environmental problems more complex. Second, eco-environmental problems that arose in a series of stages over hundreds of years in the industrialization of early-developed countries occurred simultaneously in late-developed countries undergoing industrialization. These problems included, not only resource depletion that resulted from poverty and inadequate development but also, various types of environmental pollution resulting from accelerated development. Hence, problems included not only soil erosion and land desertification resulting from agriculture activity, but also eco-environment damage resulting from manufacturing. Pollution not only resulted from industrial activities, but also from the rapid development of urbanization, such as the pollution from automobile exhausts and garbage, and not only from domestic environmental pollution, but also global environmental pollution, such as acid rain, the destruction of biodiversity, and marine pollution.

The "compound" features of eco-environmental problems determine that the treatment of the eco-environment by late-developed countries should follow their own unique laws. Therefore, the concept of special ecology introduced by early-developed countries does not transfer to the solutions of eco-environmental problems by late-developed countries. Therefore a new concept on eco-environmental treatment based on the reality of late-developed countries must be explored. Hence, in some cases, sustainability must prevail over aesthetics. Dialog is therefore essential within and between the two worlds that occupy the same planet to identify common ground.

3. Interdisciplinary ecology: innovative concept of eco-environmental treatment in late-developed countries

3.1. Concept of interdisciplinary ecology to treat eco-environment issues by late-developed countries. The grounding of eco-environmental treatment in late-developed countries lies in addressing the basic requirements and relationships of modernization and post-modernization. On the one hand, the basic fact that the not-high-enough socio-economic development level determines the modernization of civilization cannot be avoided to directly enter into the more advanced civilization of post-modernization. On the other hand, it is not possible for the late-developed countries to follow the paths of early-developed countries to finish modernization, at a heavy eco-environmental cost, before entering post-modern society.

The background and historical mission require late-developed countries to use the concept of interdisciplinary ecology to treat eco-environmental issues. Interdisciplinary ecology focuses on the relationship between humans and nature, as well as between humans and socio-economic development. Interdisciplinary ecology advocates harmony, mutual benefit, and symbiosis between humans and nature in the process of the development and utilization of natural resources. Social improvement and eco-environmental protection are stressed as the basis of economic development to realize the comprehensive, coordinated and sustainable development of the economy, society and eco-environment. This concept advocates the arrangement and progressive implementation of programs for eco-environmental protection, according to the actual situation of individual countries based on the principle of sustainable development, and upholding "common but differentiated responsibilities". The information, knowledge, greening, and ecological transformation of the traditional industrialization mode are promoted by taking the route of "new industrialization"[1]. The effective utilization of resources for self-sustaining processes, and compensation for ecological construction costs, are therefore encouraged.

The basic framework of interdisciplinary ecology includes the three systems of economy, society and eco-environment, and is compatible with the "compound" feature of eco-environmental problems in late-developed countries. The complexity of interdisciplinary ecology determines that the satisfactory effect of eco-environmental treatment is difficult to obtain if based on just unitary measures of the economy, society or eco-environment. Late-developed countries should simultaneously promote the healthy development of economic systems, social systems, and eco-environment systems, to ultimately achieve harmony and symbiosis among the three systems. In this respect, interdisciplinary ecology is a composite system of the organic unity of the three systems. As mentioned above, the backward economic level fundamentally restricts the positive development of society and eco-environment of late-developed countries. It is necessary to grasp the central task of economic development throughout, especially for large late-developed countries. However, it does not mean that late-developed countries must repeat the old path of "treatment after pollution". The traditional path of "treatment after pollution" presupposes that the relationship between economic growth and environmental degradation conforms to the "Environmental Kuznets Curve" (EKC) rule (Grossman and Krueger, 1995). For example, the degree of environmental pollution first rises then decreases

[1] "New industrialization" in the ecological sense refers to non-poisoning, non-hazardous, low emission, and environment-friendly processes in industrial production.

with the growth of per capita income, so that the trajectory of relations between environmental pollution and economic development shows an inverted U-shaped curve. However, many empirical studies show that EKC is not an absolute rule (Stern, 2004; Maddison, 2006; Egli and Steger, 2007), and economic development is also conditioned to the factor of eco-environment. As shown by Arrow (1995), while the carrying capacity of ecological resources is limited, it is closely related with technology, preferences, production, and consumption structure, but it is not fixed or static. However, damage to the eco-environment resulting from inappropriate economic growth may cause a collapse in the ecological carrying capacity before the trajectory of EKC reaches a turning point. Moreover, damage to the eco-environment damage is often irreversible and abrupt, and ignoring the dynamic change of ecosystems for extended timeframes is one of the important reasons for ecological crisis. Taguchi (2001) further pointed out that, since it usually take decades before economic development reaches the turning point of EKC, the damaging effects to the eco-environment resulting from economic growth might significantly offset the present and future value of the improvement of economic growth and eco-environment.

Therefore, it would cost less to take measures to prevent ecological degradation at the present time. Hayami (2000) expounded that late-developed countries should especially place emphasis on ecological problems, from the perspective of environmental justice. Specifically, poor people are usually the first to suffer from environmental degradation, and if the negative effect coincided with the problem of inequality, the stability of society and politics would be affected, and the foundation of economic growth would be ultimately weakened.

Social factors also play a very important role for late-developed countries to solve eco-environment problems. The relationship between humans and nature is not abstract and isolated, but closely related with various social problems. The eco-environmental problems today reflect the imbalance between humans and nature, and even human social relations. For example, social class, race, economic status or gender inequality are important factors that affect the benefits and burden distribution of the ecology and environment. Hence, the beneficiaries are often the strong groups in society, while the victims are often the more vulnerable groups[1]. Rosser and Rosser (2006) indicated that high environmental quality depends on the levels of trust and cooperativeness within society, and that this type of social cohesion might be enhanced by income equality, the government's ability to control corruption, and the willingness of citizens to participate in the legal economy and in democratic political processes. Ueta and Mori (2007) examined the Republic of Korea, Taiwan and other East Asian economies, and found that the creation of environmental regimes in these East Asian economies were closely attached to the change of government management systems. The will of citizens to protect the environment is largely determined by the level of education, and the tolerance of dialog about the issues. In addition, the role of economic development to improve the ecology and environment is more effective through relevant social policies. Kuheli (2009) found that it was not sufficient to improve the eco-environment only by means of economic growth, and environmental protection policies. Hence, good quality and administrative capacity of government regulation also plays a very important role in this process.

3.2. Advantages of late-developed countries and application of interdisciplinary ecology. Therefore, mutual cooperation among the economic system, social system and eco-environmental system is required in the treatment of the eco-environment by late-developed countries. These three systems are interrelated and interdependent, and constitute a compound system of self-regulation and symbiosis. In this compound system, the economic system plays the role of providing material and technological conditions. Social systems play the role of providing intellectual support and system security, while the eco-environment system plays the role of providing basic living resources and the environment. Late-developed countries can fully utilize "latecomer advantages", and realize the symbiosis in the development of economy, society and eco-environment. These "latecomer advantages" include adopting resource-saving technology and energy-saving technology developed by early-developed countries, learning advanced managerial expertise about eco-environmental treatment, and achieving and disseminating scientific and accurate information about the eco-environment. Taguchi (2001) examined the EKC, and found that East Asian countries indeed realize the "latecomer advantage" in environmental management and technology. With the rapid development of the economy, large ecological and environmental problems loom in China. Nevertheless, the formulation and implementation of ecological and environmental protection policy has been increasingly improved at the same time[1]. Taguchi and Murofuchi (2009) eva-

[1] One classical example is that in Taiwan, China, the Taiwan government accumulated domestic nuclear wastes, and discarded all kinds of chemical wastes and rubbish near the households of poor people (Yuan, 2005).

luated the data from 29 provinces in mainland China from 1988 to 2007, and found that China had also benefited from the environmental latecomer advantage in the process of development.

The notion of interdisciplinary ecology is proposed in view of the specific eco-environmental problem of late-developed countries, according to their actual situation in the process of modernization. For late-developed countries, the question is not the necessity to develop, but how to develop. Late-developed countries should focus on solving the eco-environmental problem in the development of the economy and society, and implementing the concept of ecological and environmental protection into the development of economy and society. General ecology also provides a new concept for international cooperation on ecology and the environment. Basically, the concept of general ecology does not exclude special ecology. General ecology essentially argues that each country should flexibly arrange the basic elements of the three systems of the economy, society, and eco-environment, and realize strategic goals according to native actual conditions. These goals are determined by the dynamic capacity and openness of the compound system itself. Therefore, on the one hand, late-developed countries should actively participate in international cooperation for eco-environmental protection, and promote eco-environmental protection, combined with economic and social development in cooperation. On the other hand, the early-developed countries should also pay attention to and support the requirements of late-developed countries to protect the eco-environment, which may be different from that of early-developed countries, due to actual conditions in individual countries, and ultimately promote the harmony and symbiosis between mankind and nature, and the harmony and symbiosis of human society through deepening cooperation across the world which we ultimately share.

Conclusion

This paper introduces an innovative perspective to envision world's development based on eco-environment and economic development status differentiating from the notion of "Developed Coun tries" and "Developing Countries". The "Developed Countries" are classified as the Early Developed Countries ("EDC"), and the Late Developed Countries ("LDC"), which is intended to help locate the effective solutions of many environmental and ecological problems nowadays and foreseeable future.

The comprehensive approach has been looked how long and how soon the countries have carried and will carry out the performances of environment and ecology from a global perspective rather than the only approach of how well the countries have improved their economies. Thus the urgent attitude toward ecological and environmental problems for sustainability should be formed in shaping the agenda of the governmental leaders, the policy-makers and the public. In that case, it is possible to realize the harmony and symbiosis between mankind and nature, and the harmony and symbiosis of human society through deepening cooperation across the world which we ultimately share.

Evaluating the EDC's path of resolving ecological and environmental problems, this paper recommends an innovative concept – "Interdisciplinary Ecology" for ecological and environment performance in LDC. This concept is articulated by comparing the different paths that EDC and LDC go through respectively and justifying the different goals that EDC and LDC set accordingly. The dilemma of keeping economic development and not sacrificing ecology and environment in LDC is clearly unfolded, and prospective solution is solicited by unrelenting critical thinking. The particularities of LDC's ecological and environment issues summarized, such as "basic-needs demanded", "compression industrialization", "environment justice", and "complexity", are the hits in addressing the relevant eco-environmental problems, indeed triggering people to think more deeply for the solutions.

This paper also envisions its future theme to further explain how to draw a clearer line between LDC and DC, and what are the new responsibilities that LDC actually shoulders in helping DC. The remaining questions would be tendered and the answers would be required in the global ecological and environmental problem settings.

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