

## **Chapter 2**

# **Theoretical and Reality Basis of GEC Research**

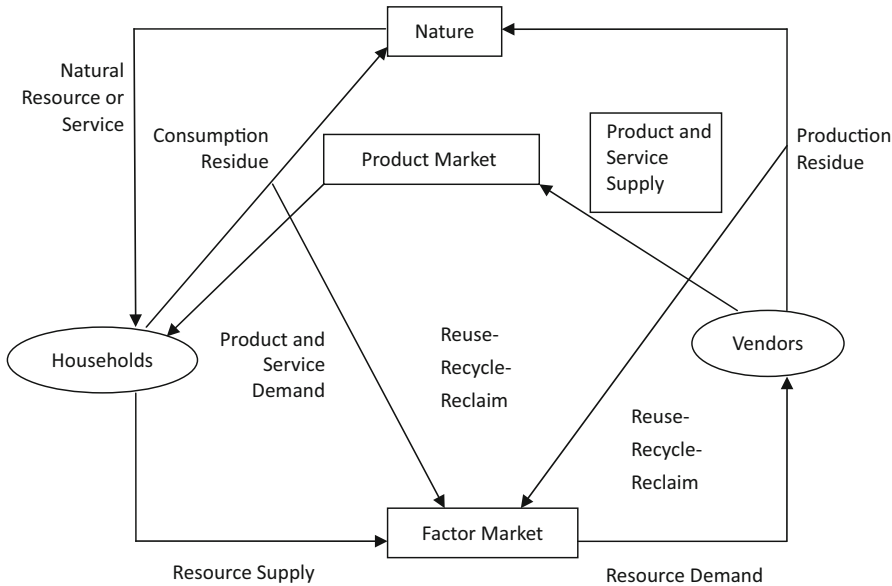
Looking at environment, economy and social development, to promote sustainable development through global partnership must enhance environmental competitiveness to solve the global ecological environmental crisis. This is not only the premise and foundation to establish the argument of this research, but also where essential value and significance of this research lie in. Whether the sustainable development of human beings needs to enhance environmental competitiveness is an issue related to economic development, environmental protection and government function, and requires profound analysis and argumentation.

## **2.1 Theoretical Basis of GEC**

Global Environment Competitiveness (GEC) is a comprehensive across-discipline research subject involving sustainable development economics, natural resource and environmental economics, environmentology, competitiveness theories and econometrics. Among these, the theories of such disciplines as natural resource and environmental economics, sustainable development economics, environmentology and competitiveness economics are the theoretical basis of environmental competitiveness research, while competitiveness evaluation methodology, econometric analytical approach and related analysis method in environmental economics also provide methodology reference.

### ***2.1.1 GEC Is a Key Component of Environmental Economic System***

Ever since industrialization, especially after the 1950s, science and technology have made fast progress and humankind's ability to conquer the nature were also enhanced enormously. The industrialized civilization has brought about great



**Fig. 2.1** Economy-environment system model: interdependence between economic activity and nature

material wealth as well as problems like deterioration of ecological environment and resource depletion. The problems are now rather severe, but the mechanism of interaction in natural environment is so intricate that the future is full of uncertainty as for how natural environment change, and so far human beings know few about it, or even know nothing. The austerity, complexity and uncertainty in environmental problems have made the research on GEC more important in the environmental economic system.

Economy and environment are mutually influential and interactive, constituting an interdependent economy-environment system. First, in the economy-environment system (See Fig. 2.1), economy and environment influence each other, with natural environment providing various natural resources (such as oil, mineral products and water) and different types of services (such as life support service and comfortable-ness service) for human economic system and at the same time economic system also influencing natural environmental system; natural resources entering economic system will eventually become byproduct or residue and return to the natural world. Secondly, economy and environment are mutually conditional; without the resources and services provided by natural environment, human beings can't survive or develop and human economic system can't operate well; meanwhile, if humans take too much from and discharge too much residue into nature as beyond the affordability of natural environment, then natural environment system will be damaged.

If human beings can correctly manage their behavior according to the laws of development in natural environment, rationally utilize natural resources, harmoniously

co-exist and friendly develop with ecological environment and continue enhancing global environmental competitiveness, then natural environment can provide not only good life support, comfortableness services, but also various natural resources, and help with the sustainable development of human economic society to realize the maximization of human wellbeing. Otherwise natural environment quality would be damaged, polluted environment quality would directly cause big loss in health, life, production, public facility, construction and property; and any preventive or compensative expenditure for such loss has an opportunity cost, which would reduce economic development. It is to say, natural environment shouldn't be regarded as an issue that has nothing to do with economics, but the core of economics and economic decision; global environmental competitiveness should be an important component of the comprehensive competitiveness of all regions of the world.

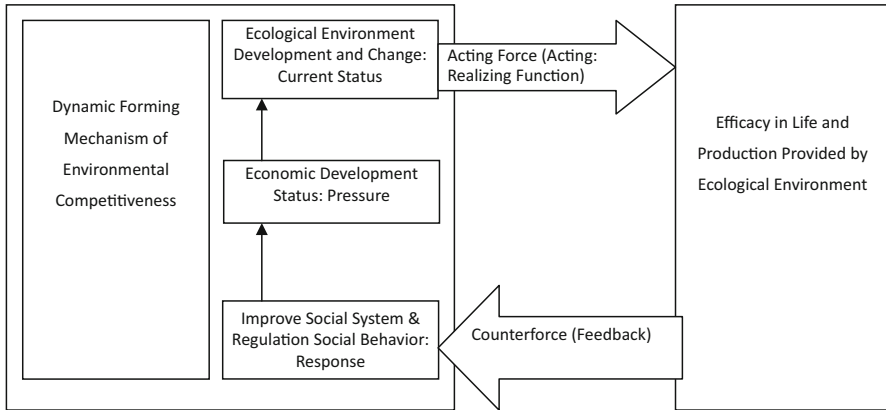
### ***2.1.2 GEC Supplemented and Developed Environmental Economic Theories***

The theoretical basis for the existence and development of global environment competitiveness are manifested in the theories of sustainable development economics, natural resource and environmental economics, environmentology, competitiveness economics and econometrics. It should be particularly noted that environmental economic theories are completely applicable to the research on environmental competitiveness; they constitute the theoretical basis of the intentional logic of environmental competitiveness. Sustainable development economics says that regional sustainable development system can be summarized into society, ecological environment and economy such three subsystems.

Ecological environment can provide production means for human society as well as life support and comfortableness services, which is the efficacy and benefit from ecological environment. Human beings will respond to the changes in such efficacy and benefit by improving social system and regulating social behavior and thus influence the pattern, speed and scale status of economic development; different status will impose different pressure on ecological environment and ultimately leads to different development in the latter. What the different status of ecological environment will provide is also different efficacy and benefit, and human beings will in turn adjust their behavior according to the changes in such efficacy and benefit. In a word, regional sustainable development system is a combination of three synthetically interlinking subsystems of ecological environment, economy and society.<sup>1</sup> This system is an integrated system under cyclic motion and dynamic development. Thus, the interaction process between ecological environment and its efficacy and benefit is very much similar to the mechanism between force and action in physics: the dynamic system of ecological environment under cyclic

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<sup>1</sup>CHEN De-min. Regional Economic Growth and Sustainable Development [M]. Chongqing: Chongqing University Press, 2000: 25–29.



**Fig. 2.2** Dynamic forming & acting mechanism of environmental competitiveness

change and composed of social response, economic development pressure and changes in ecological environment eventually forms a environmental force, which acts on human society and realizes its efficacy and benefits for human beings. And, the result of action by the force will be fed back to the dynamic system of ecological environment cyclic change and forms again another new environmental force that acts on human society. Environmental force and its efficacy and benefit for humans are a dynamic developing process with cyclic change. Comparison of the environmental force in different regions will show the environmental competitiveness in these regions. We see, therefore, the relationship between environmental force and environmental competitiveness is like the relationship between absolute value and relative value; thus the dynamic mechanism of formation for environmental force – the dynamic system of ecological environment cyclic change, is also the dynamic mechanism of formation for environmental competitiveness (See Fig. 2.2). To sum up, the theories of sustainable development economics is the basis for establishment of the concept of environmental competitiveness. Besides, other environmental economic theories also become the theoretical basis of the operation mechanism of environmental competitiveness. First, natural resources and environment allocation theories argue that environmental resource services do not have a market for trading due to their nature of externality and publicity or other causes, or the so called market failure; together with the other two even more ultimate causes of incomplete property right system and government failure, environmental problems like environmental resource abuse, exhaustion and pollution have thus occurred.<sup>2</sup> Therefore, to solve these problems requires government sector to correctly understand the publicity nature of environment, correctly

<sup>2</sup> XIAO Dai-ji, ZHENG Hui-yan, WU Pei-ying, QIAN Yu-lan, et al. A Cost-Benefit Analysis on Environmental Protection [M]. Taiwan: Junjie Publishing Co., Ltd., 2002: 13–15.

assess the value of environmental resource, establish necessary system to promote internalization of external influence and implement correct policy to regulate people's behavior, so as to realize coordinated development of economy and environment. This is an analysis of how social system influences economic behavior and further influences the status of ecological environment, or the analysis of the social response mechanism for dynamic formation of environmental competitiveness. Secondly, the econometric theories about environmental resource analyze the relationship between economic development and ecological environment from empirical angle. Environmentological theories and environmental status assessment theories are the basis of analysis on the development and changes in ecological environment status. Finally, environmental value theories and environmental accounting theories analyze and estimate the efficacy and benefit of ecological environment from micro and macro levels respectively.

Environmental competitiveness theory greatly enriches and develops environmental economic theories. First, environmental competitiveness comprehensively evaluates the dynamic development of ecological environment. Natural resources and environment allocation theory emphasizes particularly the analysis of how resource allocation system acts on ecological environment, the econometric analytical theory of environmental resource emphasizes analysis on the relationship between economic development and ecological environment from empirical angle, and environmentological theory and environment status assessment theory emphasizes the assessment of the status ecological environment; these theories almost all focus on certain angle in analyzing the dynamic system of cyclic change in ecological environment, but environmental competitiveness integrates three subsystems of social response, economic development pressure and change in ecological environmental status, which constitute a thorough evaluation of the dynamic development of ecological environment. Secondly, environmental competitiveness is a relative evaluation of the dynamic status of ecological environment. For any subject, only when the analysis on both the absolute value and the relative value are covered can we say that it is an overall analysis of the subject. Previous environmental economic theories mostly focused on analysis on the absolute value of environmental status, but environmental competitiveness analyzes the relative dynamic situation of ecological environment through comparison of different regions. Thirdly, environmental competitiveness cuts in from a very special angle to analyze ecological environment by borrowing the mechanism of force and action. Environmental value theory and environmental accounting theory analyze the efficacy and benefit of ecological environment, but environmental competitiveness analyzes the driving source of how ecological environment provides such efficacy and benefit, which not only allows prediction of changes in the efficacy and benefit, but also can find the cause for such changes. Finally, environmental competitiveness can do overall static and dynamic analysis on the regional ecological environment. Such comparative analysis could be against different regions in the same period of time as static analysis, or against the same region in different periods of time as dynamic analysis.

### ***2.1.3 GEC Is the Continuation and Deepening of Competitiveness Theory***

GEC inherits and continues competitiveness theory; at the same time, it deepens the contents of competitiveness theory. First, ecological environment system is a complex dynamically changing system. It is influenced by not only the variables within the system, but also by external factors such as human social system and economic development level; and, these influences show nonlinear relation, which makes the evaluation of the absolute status of ecological environment very difficult, or even impossible. Competitiveness evaluation methodology puts emphasis on the evaluation of the relative and comparative ability of certain property of different matters by layer analysis, which means breaking down the various complex factors that influence such property, followed by analysis of each of them, and after adding weight, the comparative ability of this property of different matters will be obtained. Such feature of the evaluation suits well with the complexity and dynamic state of the system and therefore can appropriately evaluate the dynamic development of ecological environment in different regions. Secondly, GEC enriches and develops competitiveness theory. A review of the available literature shows that so far there has been not complete analysis on the connotation, mechanism formation, evaluation indicator system and projection methodology of GEC as a concept and neither there is complete analysis on the environmental competitiveness of different regions of the world. This study, therefore, will greatly enrich and develop the related competitiveness theory and analysis methodology.

### ***2.1.4 GEC Is the Ability for Sustainable Development Worldwide***

Environmental effect is actually the process of how natural environment acts on human beings and also human ability of how to protect and kindly treat the nature, which is ultimately expressed as how natural environment support and facilitate human survival and development and as an ability for regional sustainable development; it is the result of the operation of the dynamic system of the cyclic change of ecological environment. GEC is the result of comparing the environmental effects of different countries of the world; the relationship between GEC and environmental effect is the relationship of relative value and absolute value, sharing identical inherent connotation. First, GEC is natural environment's effect on humankind. Economy and environment are mutually influential and interactive, constituting an interdependent economy-environment system. Natural environment acts on humankind from three aspects: (1) Natural environment provides various material resources for human economic system (such as oil, mineral

products and water); (2) Natural environment provides various services for human economic system (such as life support service and comfortableness service); (3) Natural environment is at the same time a place of purification for the residues of economic system. Therefore, evaluation of the current status of the natural environment's effect on humankind should include the evaluation of the capacity of natural environment to provide all kinds of resources (reflecting the resource supply capacity of environment), the capacity of natural environment to provide ecological service (reflecting the ecological service supply capacity of environment) and the capacity of natural environment to provide environmental purification (reflecting the purifying capacity of environment). Secondly, GEC is the capacity of humankind to protect and kindly treat the nature. Human economic activities will impose great pressure on natural environment and environmental governance and protection by human beings will also improve natural environment. Therefore, the evaluation of human capacity to protect and kindly treat the nature should include evaluation of the pressure of economic activity by human on natural environment (reflecting the coordinating capacity of environment and economic system) and human capacity to govern and protect environment (reflecting human capacity for environmental governance). In the end, GEC is the interactive force between humankind and environment, appearing as natural environment supporting and facilitating human survival and development and the sustainable development capacity worldwide.

## 2.2 Reality Basis of GEC

The existence and development of GEC not only has sufficient theoretical basis, but also turns out to be necessary from the development realities faced by the world. The history of human development tells us that environment has always been the key factor for human survival and development, especially after industrialization when productivity witnessed unprecedented progresses and human influence over environment continued extending; thus environmental problems appeared and threatened the survival and sustainable development of human beings, with global climate change as the biggest problem. The world community has been well aware of the seriousness of these problems and started aggressive actions with some achievements, but there is still a long way to go to find the final solution for environmental problems. At present, solving environmental problem and realizing sustainable development are the common understanding and a development strategy for all countries of the world; it is foreseeable that environmental competitiveness will be a key component of national comprehensive competitiveness. To realize sustainable development must enhance global environmental competitiveness. The constraints of related environmental theories in practice call for new theory to provide guidance. These together constitute the practical basis of global environmental competitiveness.

### ***2.2.1 Enhancing GEC Is Related to Human Survival and Development***

In retrospection of the historical process of human development, we can find that the entire human history is the course during which humankind continues fighting with environment and get adapted to environment. Only by harmoniously co-existing with environment, can human beings survive and all countries can thrive; otherwise, death and declining wait. In the Quaternary Ice Age about three million years ago, the earth once encountered climate crisis, and it is during the process of solving this crisis that humankind came into being. At that time, climate was extremely cold and forest area decreased in large scale, which seriously threatened the survival of ancient ape and caused large quantity of deaths. But a few number of ancient apes changed habits of life. They stepped down from trees, learned to make and use tools, rebuild the environment and fight against coldness and hunger; thus humankind came into being.

Ancient humans could only live on collection and hunting and fishing during the very long process of development. As they didn't know how to build a well, they couldn't be far away from water source and thus the biotic resources available for collection and hunting or fishing were very limited; very often, depletion of biotic resource occurred because of excessive collection and fishing or hunting. Therefore, food crisis occurred too. This is an environmental problem that directly influenced production. Food crisis forced ancient humans to change again the lifestyle and production mode. In about 8,000 years ago, humans learnt farming and raising livestock; human society entered a new stage, i.e. from primitive society to agricultural society.<sup>3</sup>

In agricultural society, production developed, living conditions were improved, and social civilization progressed in big steps; there appeared even great ancient civilizations like ancient Egypt, ancient Babylon, ancient Greece, ancient India and ancient China. But at the same time, new environmental problems occurred too. Owing to increasing growth of population, expansion of farming land destroyed vegetative cover, forests were laid down and grasslands were cultivated, followed by soil erosion and desertification; irrational irrigation further caused salinization. These were all destruction to land resources and in turn damaged the economic foundation of agricultural society. Thus some ancient civilizations declined, or forced to migrate to other areas. So, another environmental problem occurred – land crisis. So far the human society is still in the trouble of land crisis.

Entering industrial society, human capacity of production has made unprecedented progresses. In order to satisfy the unlimited desire, humans exploited enormous natural resources and the “three wastes” were recklessly discharged into environment. When the amount of discharge has accumulated to the degree beyond environmental capacity, pollution would be the result. Now environmental pollution and recession in the entire globe is already rather severe. According to the data in

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<sup>3</sup>CHEN Ying-xu. *Environmentology* [M]. Beijing: China Environmental Science Press, 2001: 8–9.

UNEP Yearbook 2009, there are currently 25 countries where the entire forest ecosystem has disappeared and another 29 countries with 90 % of decrease in that. Since the 1960s, the biomass of major economic marine fishes has been reduced by 90 %. Till the middle of this century, the available agricultural acreage per capita might be less than 0.1 hectare, which requires increase in agricultural productivity; yet that is not possible to be realized simply relying on traditional method. Climate change is another painful example. As the continually discharged greenhouse gases can't be "internally consumed", we have paid so high a cost that could hardly be imagined even a few years ago: the water reservoirs located in the Mediterranean and the Midwestern USA would soon be dried up; and the ice cover on Greenland is possibly disappearing at the speed of 100 cubic kilometers per year, leading to rising of sea level. The North Pole is no less than a big storage of methane. In the northwest of Svalbard, there are now more than 250 seething mantle plumes, a signal warning the coming of the "critical" point of earth's climate.<sup>4</sup> All these indicate one thing that the present environmental problems have become a bigger threaten to the survival and development of human beings.

### ***2.2.2 Enhancing GEC Is a Definite Requirement of Combat Against Climate Change***

Although humans kept records about meteorological phenomena since as early as 1861, till the 1960s and 1970s were people aware that economic development accompanied with destruction of environment is not sustainable; excessive taking from the nature by humans would finally punish humans itself and greenhouse effect is an apparent example. In 2007, the UN pointed out in IPCC Fourth Assessment Report that the possibility of attributing climate warming to the greenhouse gases discharged due to human activities has increased from 66 % in the 2001 assessment to over 90 %; influence of climate change covers all aspects of natural ecology and social economy, from water resource to food safety and human health, and to the root of global operation – energy. Former Chief Economist of World Bank Lord Stern indicated in his Stern Review: The Economics of Climate Change that climate change has caused an economic loss that might reach 5–20 % of annual global GDP and may particularly impact the developing countries including China. In a word, climate change as an issue has completed a hop skip and jump from "scientific issue" to "political issue" and to "economic issue", and finally to the all-inclusive strategic height of "development issue".

Global warming is a complicated issue and people's understanding of the issue far from adequate; besides, as the causes and influences of global warming are worldwide, any effective policy or solution must rely on international covenant. The world community has made great efforts in this issue. The United Nations

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<sup>4</sup>UNEP. United Nations Environment Program Yearbook 2009 [R]. UK: SMI (Distribution Services) Ltd., 2009: 1.

Framework Convention on Climate Change, Kyoto Protocol and Copenhagen Agreement are all important climate resilient legal documents, and the international system guarantee for the universe to jointly solve the historically most challengeable environmental externality problem. These all reflect the complexity and persistence of climate change; and tomorrow, the international community will have to put more efforts to solve this world issue.

Although the global negotiation process against climate change is not smooth, international conducts never stopped and the international system framework for the issue of climate change is foreseeable, which will eventually become a global agreement covering political, economic, social and cultural fields and, through international political and diplomatic channel, be transformed into legal obligations and policy of all countries with the efficacy like such international codes as the United Nations Charter and GATT. That means increasing global environmental competitiveness, energy-saving and emission reduction, increasing carbon sink, controlling emission of greenhouse gases, improving global climate, which will become compulsory obligations within legal system.

### ***2.2.3 Enhancing GEC Is the Key Part of Enhancing the Comprehensive Competitiveness***

Green economy is the future direction of world economy. No matter at macro-level, meso-level or at micro-level, environment always influences almost all aspects of economy of a nation; in other words, global environmental competitiveness will be the key part of a nation's comprehensive economic competitiveness.

First, from the macro-level, the instrument to measure the overall economic level of all countries is still Gross National Product (GNP); but in fact, under the current sustainable development strategy, GNP is inappropriate, because it does not consider such problems as environmental pollution, resource depletion and social security caused by economic growth: in the first place, GNP does not calculate the loss caused by environmental damage; and in the second, the expenditures use to handle environmental pollution and resource destruction are included in GNP. Therefore, specialists and scholars are all studying new economic accounting system that includes both natural resource and environment. Thus it can be seen that the level of environmental competitiveness will directly influence the general economic level of a nation.

Secondly, from the meso-level, green economy has already become the direction of future economic development. The Copenhagen Climate Change Conference held in 2009 has set the requirement that by 2020 emission shall reduce 30 % from the base of 1990. According to the analysis of International Energy Agency, if by 2050 greenhouse gases emission were reduced to the level of 2005, the marginal emission cost per ton of CO<sub>2</sub> would reach \$50; if by 2050 emission were reduced to 50 % of 2005 level, the marginal emission cost would reach \$200–\$500 per ton of CO<sub>2</sub>, which is equivalent to ¥620–¥2,480 or even ¥6,200 of cost for each ton of coal. “Low-carbon economy” thus appears. It aims at reduction of greenhouse gas emission and establishment of economic development system based on low energy consumption and low

pollution. This includes low-carbon energy system, low-carbon technology and low-carbon industrial system. Through levying carbon taxes on high-emission and high-carbon economies (such as coal, steel, non-ferrous metal, etc.) and transaction of Certified Emission Reduction (CER), subsidies for low-carbon or zero carbon emissions economies (primarily clean energy) and thus the objective of reducing CO<sub>2</sub> emission and solving climate problem can be reached, forming a low-carbon economic system.<sup>5</sup> So to speak, green economy like environment-related low-carbon economy is the direction of future economic development.

Finally, from the micro-level, green competitiveness has already become the core competitiveness of enterprises. Core competitiveness is the source an enterprise to obtain and maintain competitive advantage; its characteristics are reflected in at least three aspects: particularly good for realizing customer-emphasized value; hard to be copied by competitor and hard to be replaced; persistence. Enterprise having green competitiveness would have advantage in realizing user's value compared with other enterprises, because, with people's requirement on the material standard of living getting higher, consumers show increasing preference to environment-friendly products and hence green products can bring more value to users. Moreover, the technology and knowledge implied by such value activities as green production, green design and green material supply makes green competitiveness something difficult to be copied by ordinary enterprises and thus help the enterprise maintaining persistent competitive edge. Today, when green consumption becomes a vogue, green itself becomes a commonly understood concept, green products are well accepted by the public and when green market extends wide, green competitiveness has become an important part of the core competitiveness of an enterprise, or even become one of the fundamental ability to survive and grow.<sup>6</sup>

### ***2.2.4 Enhancing GEC Is a Practical Choice to Realize Sustainable Development***

Since the advent of humankind, she has established an inalienable close tie with environment. In retrospection of the historical process of human development, we can find that the entire human history is the course during which humankind continues fighting with environment and get adapted to environment. Only by harmonious coexisting with environment, can human beings survive and all countries can thrive; otherwise, death and declining wait. In the two or three million years of Paleolithic Age, primitive humans lived on hunting and fishing and collection simply relying on environment; till the Neolithic Age about 10,000 years ago, ancient humans began invention of simple tools to utilize environment and started agriculture and animal

<sup>5</sup>Shihua Financial Information. Low-Carbon Economy is the Direction of Future Economic Development [EB/OL]. <http://content.caixun.com/NE/01/ct/NE01ctka.shtml>, 2009-05-1/2010-03-20.

<sup>6</sup>MBALib. Green Competitiveness of Enterprise [EB/OL]. <http://wiki.mbalib.com/wiki/%E4%BC%81%E4%B8%9A%E7%BB%BF%E8%89%B2%E7%AB%9E%E4%BA%89%E5%8A%9B>, 2010-06-6/2010-03-20.

husbandry as well as handicraft activities like jade carving. Since then, especially about 5,000 years ago, with the start of human civilization, driven by increase of population and continued progress of production technology, the area coverage by human colonization has been continually widened, followed by environmental problems. Particularly after humans entered industrial society, the pace of development has exceeded any time in history. When people enjoyed the benefit of economic growth, they have to face the increasingly severe environmental problems.

In the 1950s and 1960s, environmental problem began one of the biggest concerns of the public. Frequent environmental problems in developed countries have made related researches shift gradually from microscopic areas like resource depletion, pollution control and environmental protection to macro issues like resource environment system, and environment was tightly attached with economic development. The researches on environment problems also broke the geographic limitation within a country or region; it has become a problem to be faced and solved by the entire world.

Today, the influence of the international financial crisis is not yet cleared, and world economy is just at the turn of a new round of structural adjustment and the critical period for innovation development; global resource and environment issues will be a big challenge for the international community for a long period, such as climate change, energy security and biodiversity protection; and green development, circular economy and low-carbon economy are increasingly becoming the trend of development. Particularly after March 11, 2011, when the Fukushima nuclear disaster triggered by the earthquake and tsunami in Japan again stroke the bell for nuclear pollution, countries like USA, Europe, China and Korea successively detected artificial radioactivity substance in both air and ocean several days later. The hazard and consequence on environment and humankind due to this nuclear crisis are to be further assessed, but environmental issues like nuclear pollution and nuclear security undoubtedly become the focal issue of public concern again. Therefore, whether to confront the shock from world's new economic development, or the supportiveness of resource and environment, we must enhance environmental competitiveness and take it as the breaking point to optimize economic structure, accelerate the transformation of development pattern and to realize the transition from industrial economy to ecological economy; only so can a country take dominance in the new round of international competition.

### ***2.2.5 Enhancing GEC Is an Innovation to Overcome the Limitation of Environment Related Theories in Practice***

Environment related theories are actually all from objective practice, which offer guidance and reference for assessment of and solution to environmental problems. But, as the historical context of researchers, the subject for study and the focus of research are different, some theories show apparent limitations. (1) Environmentology. It can tell us the constructive principle of environment, principle of various pollutions (water pollution, atmospheric pollution, soil pollution, noise pollution and ecological effect of environment pollution), the indicators and standards for judgment of the

status of environmental pollution as well as environmental pollution control technologies. But, it is more research on the various principles and control technologies of environmental problems from the perspective of natural science; it can only tell us the current status of environmental pollution and under such circumstance what technologies to be adopted for governance. Here are two problems: first, environmental pollution is not solely caused due to technical reasons; actually, environmental economics already demonstrated that the root cause is the externality of environmental resource, but people do not thoroughly understand this. Just because of the dual effects of both market failure caused by externality and policy failure caused by inadequate understanding, environmental problems appeared. Therefore, environmental pollution governance should essentially be to correct the market failure and policy failure. Secondly, assessment and measurement of environment must include status, pressure and response, because environmental change is such a dynamic consecutive process, during which, when human activities impose certain pressure on environment, environmental status would change and the society should respond to such change to restore environmental mass or prevent environment from degradation. If the measurement and assessment only covers current status of environment, the dynamic change of environment can't be obtained. (2) Natural resource and environmental economics. It discussed the root cause of environmental problems from the socio-economic perspective, put forward various policies and economic means to control environmental problems, explored the value connotation of environment and proposed different types of methodologies for environmental assessment. But, these analyses must be established on the data of environmental status. So, natural resource and environmental economics need the theoretical support of natural sciences such as environmentology. In addition, although natural resource and environmental economics attempted including environment (resource) into the system of national accounts so as to establish appropriate sustainable development ability evaluation system, there is still no single final conclusion from the existing environment and economic comprehensive accounting; from related research results we observed that there are at least two weaknesses: (1) Simple natural resource accounting or roughly putting natural resource depletion value and ecological environmental degradation value into national accounts. This fails to differentiate economic value and ecological value according to its correlation to economic strength and its essential characteristic; thus confusion of the relationship between economy and environment might occur, which is kind of barrier to the provision of objective, systematic and orderly baseline data for the establishment of policies regarding economy, natural resource, environment and other related price policies. (2) Roughly copying SEEA related concept of natural assets, which might lead to magnified comprehension of natural resource and misunderstanding of it, confused with concepts that are commonly used in economic sphere, such as economic assets and financial assets. Finally, environment and economic comprehensive accounting theory are already mature, but it can only be used to evaluate static regional sustainability, not the dynamic development trends of regional sustainability.

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