

Ecological Civilization Construction in China:

Origins, Concepts and Paths

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Abstract. This paper is a first step towards articulating a Chinese version of ecological civilization construction (short for ECC). Three major intellectual sources of ecological civilization are identified and the constraints from resources and environment on economic development are emphasized. The concept framework of ECC contains four aspects: the subjects, the objects, the means and the scope. The subjects have five main types: the governments, the entrepreneurs, the families, the NGOs and other mixed ones. The objects involve in various type of ecosystems, The means can be used by education, plan, institution, technology and fund. The scope is stratified five spatial levels: the earth, the nations, the regions, the prefectures, and the communities. Moreover, four paths of ECC are highlighted: resources conservation and saving, environmental protection and improvement, ecological protection and restoration and territorial development and protection.

Introduction

Under the background of Eighteen People's Congresses proposing “Promote the construction of ecological civilization”, ECC in China is placed on unprecedented heights. This endeavor marked the application of ecological civilization entered the fast lane and received the widespread attention of the world. Some academics aimed at connotation, characteristics or status of ecological civilization, but these still stayed in the stage of theoretical discussion[1-4]. From the angle of the construction, we should address three main questions: what is the background of ECC in China or how does ECC come from? What is ECC conformed to China’s actual conditions? How ECC is to be operated and what agendas or paths should be served?

The origins of ECC in China

The ECC in China is not suddenly proposed but experienced a process and is still ongoing with the times. The term of “ecological civilization” was officially proposed at the first time in 2005, and then it was taken as one of the goals of building a well-off society in an all-around way in 2007. The ECC was stressed at the same height as economic construction, political development, culture construction and social construction at the Fourth Plenary Session of 17th CPC Central Committee in 2009, after that the significance of ECC was emphasized again at the fifth plenary session of the 17th CPC Central Committee in 2010. ECC was promoted to be in a prominent position at Eighteen People's Congresses for the attribute closely related to people’s well-being and nation’s future. It pointed out ECC should be taken seriously and play the basic and oriented function though every aspects of economy, society, culture, livelihoods, resources and environment in late 2012. As can be seen from the above, ECC has an increasing status and requires a systematic theory to guide practices. In order to clarify the Chinese interpretation of ECC, a preliminary overview of its emerging background should be primarily presented.

The theoretical origins. The theoretical origins mainly come from three aspects: Firstly, Chinese ecology view is one of the origins. Compared to westerners, Chinese have a special understanding of ecology. Ecology in the west is commonly a scientific word. the term “ecology” and “civilization” are usually separate in the west. Westerners take nature as a starting point to discuss the relationship between human and nature and consider humans and its social system as a subsystem of natural ecosystem. It is closely related to evolutionary biology, genetics, and ethnology. However, Chinese focus ecology on the harmony between humans and nature from the angle of human development. Ecology in China indicates a state of harmony, mostly used to describe the niceness or beauties. Therefore, “ecology civilization” are easily together in China. Secondly, Marxism environmental philosophy is another essential origin. Marxist environmental philosophy covers the scientific practical view and the conception that the human and the nature should be harmonious. The former is of great significance to the generation of EEC. “Practical human view of nature” is the essence of Marxist view of nature, which differed from other old philosophy. It reveals the dialectical unity between man and nature relationship. For human practices, especially production practices, fundamental changes have taken place between human and nature. Nature is not only the object of human practices but also restricts the social development. Marxism environmental philosophy emphasizes the active function of human beings to nature, but does not ignore the restriction from the nature.

Thirdly, Chinese harmonious culture is also an important origin. Chinese harmonious culture symbolizes “heaven and man” theory, which is widely reflected in the Confucianism, Taoism, etc. *Laozi* demonstrated that human is consistent with heaven, heaven with earth, earth with essence and essence with nature. Mencius pointed out that farming should be in the right season, catching fish should not use tiny nets. Under the influence of these thoughts, the first act *Zhoushu* about environment protection were promulgated in Zhou dynasty, which mentioned “Yu ban”, that told us agricultural production should follow the law of nature, “don’t enter into the forest to cut the trees down but let them grow free in March, and don’t go to the rivers to net fishing but let fish grow well in June. After that, environment protection acts were published in succession, that contributed to the balance of the ecological environment and the sustainability of the Chinese civilization.

The current settings. ECC is a urgent mission in the current settings, which is facing great pressure from three aspects: Firstly, Natural resources restriction. China’s natural resources are abundant in terms of the gross amount, but low in per capita quantity. The per capita fresh water, arable land and forest resources account for 28%, 40% and 25% of the world average, respectively. The per capita recoverable reserves of oil, iron oil and copper are 7.7%,17% and 17% of the world’s average, respectively [5].With the rapid growth of the economy and the industrialization rate , there are some changes in natural resources on economic development: Firstly, local restriction turns into overall restriction. The number of provinces faced natural resource shortages have increased rapidly in the past few years: coal shortages occurred in 19 provinces in 1990 up to 23 provinces in 2009; oil shortages occurred in 14 provinces in 1990 up to 23 provinces in 2009; gas shortages occurred in 25 provinces in 2009, up 20 provinces in 1990(See Table 1).Furthermore,the number of provinces of abundant water resources reduced by 4 and extreme water shortages area increased by 2. Secondly, temporary constraints turns into long-term constraints. Flow constraints of Resource caused by technology and cost has become stock constraints [6].With the decline of non-renewable resources stock, mineral resources mining life is shortening quickly, the increasing growth of ratio of dependence on foreign energy has exceeded 15% in 2010 from less than 10% in 2001.Thirdly,

individual restriction turns into systematic restriction. The constraints of land has influenced food security, and then it runs to lag the development of the city. Not only is water restricted by availability and quality but also it is restricted by function, ecology and institution. Fourthly, elastic constraints turns into rigid constraints. In 2008, the per capita Ecological Footprint in China was 2.1 gha or 80% of the global average. However, this has already exceeded the global sustainability threshold and is over two times the available per capita bio capacity in China. In view of its huge population, the total Ecological Footprint of China is the largest in the world[7]. Fifthly, recessive restrictions turns into overt restrictions. 62 percent of the country's major rivers have been seriously polluted, 90 percent of waterways flowing through urban areas are contaminated, more than 300 million residents are yet to have clean water to drink, and quite a number of localities fail to fulfill the required quotas for pollutant emission reduction and energy saving.

Table 1, Number of provinces occurring energy shortage in 20 years and water shortage in 10 years

Type of shortage	1990	1995	2000	2005	2009
Energy					
Coal shortage	19	19	26	22	23
Oil shortage	14	18	19	22	23
Gas shortage	5	5	9	23	25
water					
Rich			10	9	6
Mild shortage			9	12	14
Severe shortage			4	3	2
Extreme shortage			1	1	3
Below living standards			7	6	6

Secondly, Unsustainable mode of production. China has been the second-largest and liveliest economy in the world now, the industry occupies an important position in China's national economic system, In 2010, the total industry added 16.1 trillion RMB, accounting for 40.1% of GDP. But the rate of synthetic energy efficiency is about 34% equal to the level of developed countries twenty years ago. Energy consumption intensity is far above the average world's level, about 4 times as much as the USA's. The GDP is only \$0.37 produced by per kg of standard coal, while the world's average level is \$1.86. Energy consumption per unit of mainly products is 40% more than oversea advanced level. China overtook the United States to become the world's largest contributor to CO² emissions in 2007[8]. Rather than focusing on the rate of economic growth, the quality of the development has become a more urgent thing, we should attach the importance to the optimization of resource allocation, pollution prevention, environment protection, and then to the harmonious the economy and ecology.

Thirdly, public stress for the environment. However, the tendency of environment deterioration has not effectively contained. Water, air pollution is still serious. The total emission amount of wastewater and nitric oxide showed a rising trend. China's environmental stress mainly comes from two aspects: domestic and international pressure. According to the theory of EKC, people will pay more attention to the resources and environment and pursue high quality of life when GDP Per capita is over \$5000. China's per-capita GDP in 2011 stood at \$5432, above \$5000. Environmental pollution has been one of the most serious social problems¹. 10.2 percent of interviewers ranked

¹China Environmental Awareness Program. 2007China Public Environment Awareness Report,2008

environmental pollution in the first of social problems, Environmental pollution after weighted was ranked fourth at 13 items of social problems. The public thought the environmental pollution was less seriousness only than medical treatment, employment and income gap. Citizens will seek for the quality of life, willing to buy the environmental-friendly products, ready to accept more restrict regulations of resources and environment. Moreover, China's environmental problems have also been caught the wide attention from the international community. As a responsible player on the global stage, China has great pressure for environmental protection.

The concept of ECC in China

ECC is a progress of creating ecological civilization achievements. Hu Jintao’s report to the 18th (the Communist Party of China) CPC national Congresses pointed out that ECC was to construct a resource-conserving and environmental-friendly society aimed at sustainable development, on condition of resource and environment carrying capacity and nature law. It revealed the essence and goal of ECC, but a more urgent issue of the implementation of ECC to be solved in advance is the implementation of ECC. Hence, ECC needs a more detailed explanation, especially from the practical view. We can define ECC from four aspects: the subjects, the objects, the means and the scopes.(See Fig.1)

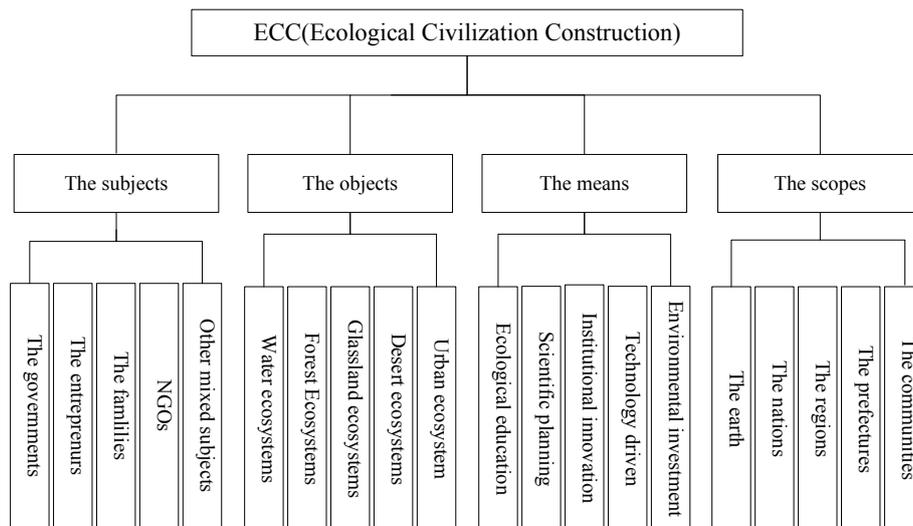


Fig.1, Concept framework and status of ECC in China

The subjects. ECC need a broad participation by all people, including the government, the entrepreneurs, the families, the NGOs and other mixed subjects, thus these are all subjects of ECC. The governments play important roles as policymakers, promoters and public environmental service provider; the entrepreneurs are the leading force of green economic development and main technical innovators; the families forms the wide participations as basic units; the NGOs provide professional consultation and supervision for ECC.

The objects. The objects of ECC involves in various type of ecosystems, which are water ecosystems, forestry ecosystems, farmland ecosystems and desert ecosystems, urban ecosystems and etc. ECC should identify different situations or functions of them. ECC for water ecosystem should ensure to implement the most strict water resource management system effectively, build the water-saving society aimed at controlling water use and enhancing water-use efficiency, construct a

reasonable water resource allocation(Ministry of water resources,2010). For forestry ecosystem, Expanding green area by afforestation and strengthening forest management to make sure the function of trees as ecological barriers are the crux of the matter. ECC for farmland ecosystem targets the maintenance of stable and continuous farmland ecological system by building agricultural production system followed by the natural law. ECC for desert ecosystem focus on land management and ecological restoration, supplemented the innovation of land use. ECC for urban ecosystem aims to create more livable space, with the ecological transition of the industry.

The means. ECC's realization can take by means of education, plan, institution, technology and fund. Firstly, the propaganda and education of ecological civilization contributes to strengthen the awareness of ecological protection and the respect for nature law, and hence forms the environmental-friendly behaviors; different levels of planning can determine the whole layout, guide the development direction, control land use intensity and standardize the development order; institution innovations should happen in the fields of resource, environment, ecology and space management, including the improvement of laws and regulations, the integration of management services system and the establishment of the government assessment mechanism; increasing the investment for ecological protection helps to improve the ability of ecosystem services and guarantees environment quality; developing the ecological science and technology by the implementation of innovation project propels the transformation and application of science achievements about ecology and environment.

The scopes. The scope of ECC is stratified five spatial levels: the earth, the nations, the regions, the prefectures, and the communities. These levels differs their functions. At the earth level, ECC is regarded as an innovation and application of the theory of sustainable development, and provides new power for worldwide environment movement; at the nation level, land space optimization aimed at the balanced development is the priority; at the region level, overall rational planning and coordinated development, and enhance the innovation of system and mechanism are the emphasis; at the region prefecture level, it is the main domain of implementation of ECC, which is in a good position to propel green development of the industries and green wealth of the society; at the community level, the equality of basic public services and resource-saving lifestyle should be advocated.

The key paths for ECC in China

Resources protection and saving. Linking man with environment, resource is a subsystem used by humans directly while environmental degradation is the outcome of utilizing the resources unreasonably. Moreover, the per capita consumption of water, energy is increasing continuously in the period 2000-2010, the high pressure of resource produces unsafe factors. Therefore, protect and save resource should be given a priority for CEC in a severe resource situation in China. The key point of this path focus on resource saving. The government should step up efforts to reform resource-price formation mechanism so that it's useful to reflect its scarcity, or relation of market supply and demand or the cost of environmental pollution or the cost of production safety. It is supposed to be reformed to have a more clear boundary, a smoother flow of the property right system of resources. optimize the structure of resource tax and dues, adjust the standards of water resources fees, compensation tax for mineral resources or cultivated land occupancy. Resource

management system should be integrated to strengthen resource management of governments at all levels.

Environment protection and improvement. The welfare of human is closely affected by environmental quality. Environmental protection and improvement directly aims at the welfare of human settlement, and contribute to build a well-off society proposed by China government, hence it is vital for CEC and should be strengthened under the press of environment problems. The key is to enhance the quality of environment. The government should improve Environmental assessment system by carrying out different levels of environmental assessment like the levels of construction project, special plans and development strategies, enhance the independence, objectivity and impartiality of environmental assessment. It is also supposed to make steady progress in improving environmental information disclose system and spread environment information, Public announcements and public hearings is necessary to develop the functions of social supervisory. Environment-friendly entrepreneurs and program should obtain more credit support. Environmental alarming system, emergency treatment of environment events, duty-charging system and compensation system of environment damage are supposed to be set up.

Ecological protection and restoration. China's geographical and geological environment is complex and diverse, with a high proportion of land unsuitable for human habitation that has poor natural ecological conditions. The arid and semi-arid regions account for 52% of the country's total land area; 90% of natural grasslands has varying degrees of degradation, and half of the grasslands have moderate or significant signs of desertification and salinization[9]. At the same time, China is one of the countries with most serious natural disasters, and the direct economic caused by nature disasters increased markedly from 2008. With the fragile ecological conditions, ecological protection and restoration can help to leave more restoration space for nature, give more fertile farmland for agriculture, and provide more beautiful homes for descendants. Ecological protection and restoration should aimed at enhancing ecological service. Firstly, Ecological value is supposed to be given a scientific evaluation. The government should establish and improve ecological compensation system, accelerate to formulate and implement ecological compensation regulation, and improve transfer payments system of ecological compensation. It should guide social capital investments to ecological construction and set up a diversified guarantee system of ecological investment. A governance system of ecological restoration should be established and protected system should be put into practice in the key ecological restoration areas. It has to implement a margin system of ecological restoration, live up to the responsibilities for ecological restoration and set up a long-term mechanism of financial investment for major project.

Territorial development and protection. Without spatial control and zoning for a long time, the disorder of territorial development and the improper intensity resulted overall imbalance in China. The total amount of cultivated lands from 130 billion hm^2 to 122 billion hm^2 , the per capita decreased from 0.106 hm^2 to 0.091 hm^2 , was approaching the red line of agriculture products safety, Developing resources, regardless of resources and environmental carrying capacity in some areas, resulted in water shortage, energy deficiency, land subsidence, serious pollution, forest deterioration partly, wetland shrinking, water and soil loss and so on. The development disorder of space generated the imbalance of population distribution and economic layout, the low output of unit space of urban construction and mining, a high shrinkage of green space. Territorial development and protection is a spatial regulation for ECC. Territorial development and protection aims at controlling development intensity, adjusting space structure, coordinating resources,

environment and ecology by space. It's a path by spatial regulation for CEC to optimize the spatial pattern of regional development in China. Reforming territorial regulations aimed at optimizing space. The government has to accelerate to complete the national territorial planning, implement strictly MFOZ and strengthen land regulations. It is supposed to establish and optimize the codes and standards of territorial development, protection and management separately, and prohibit unreasonable behaviors of territorial development strictly but encourage and support territorial protection and management actions.

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