

# Ecological and Environmental Protection of Jiangxi Province from the Perspective of Low Carbon Economy

Chundi LAN\*

College of Marxism, Jiangxi Normal University, Nanchang 330022, China

**Abstract** With urban economic growth, the urban ecological and environmental pollution is deteriorating. In turn, ecological and environmental pollution restricts urban economic growth. To realize coordinated development of urban economic growth and urban ecological environment, it is recommended to vigorously develop low carbon economy. On the basis of basic situations of ecological and environmental pollution in Jiangxi Province, following the connotation and development principle of the low carbon economy, this paper discussed ideas of ecological and environmental protection in Jiangxi Province, to lay a solid foundation for better promoting social and economic growth.

**Key words** Low carbon economy, Jiangxi Province, Ecological environment, Ideas of protection

## 1 Introduction

With acceleration of urbanization and industrialization, the conflict between economic development and environmental pollution is growing. It is urgent and essential to find proper ways to resolve this conflict. According to the strategic requirements of "Golden and Silver Hills, and Clean Water and Green Mountains" and "Ecological Protection and Green Development" set forth by Jiangxi Provincial Party Committee and provincial government, Jiangxi Province should develop low carbon economy, promote economic growth, and protect ecological environment, to realize green GDP. On the basis of basic situations of ecological and environmental pollution in Jiangxi Province, following the connotation and development principle of the low carbon economy, we discussed ideas of ecological and environmental protection in Jiangxi Province, to settle the conflict between social and economic development and ecological and environmental protection.

## 2 General situations and existing problems of ecological environment in Jiangxi Province

**2.1 General situations of ecological environment in Jiangxi Province** Jiangxi Province is an inland province in southeast of China. Situated in subtropical zone, Jiangxi Province is abundant in biological resources. There are 5000 types of higher plants and 5300 kinds of animals in Jiangxi Province. Besides, Jiangxi Province has a total forest area of 88978 km<sup>2</sup>, growing stock of 69070 km<sup>3</sup>, the forest coverage up to 53.37%<sup>[1]</sup>. On the whole, the ecological environment is excellent. However, at the same time of economic development, it neglects ecological and environmental protection, which disrupts ecological environment of the whole province. According to statistical yearbook of Jiangxi Province, in the end of 2009, the sewage discharge amount of Jiangxi Province reached 691.13 million m<sup>3</sup>. Although about 517.68 million m<sup>3</sup> has

been treated, 173.45 million m<sup>3</sup> of sewage is still not treated<sup>[2]</sup>. Besides, in agricultural production, there are problems of unreasonable use of chemical fertilizers and pesticide, leading to increase in waste, residue, and crop straws, water, soil, biological, and air pollution. On the other hand, urban residents also produce much domestic rubbish, domestic sewage, smoke and dust, nitrogen oxide, CO, and hydrocarbons. Therefore, such environmental pollution seriously affects sustainable development of economy, society, and ecological environment in Jiangxi Province.

### 2.2 Existing problems of ecological environment in Jiangxi Province

**2.2.1** Natural resources are deteriorated and ecological environment is degraded. In recent years, Jiangxi Province has made certain achievements in ecological and environmental protection, but there are still many problems. (i) Serious water loss and soil erosion. Jiangxi is situated in south China and belongs to provinces vulnerable to water loss and soil erosion. In addition to unreasonable development and use in recent years of economic growth, the water loss and soil erosion become increasingly deteriorated. For example, the development of furniture industry needs large amount of timber, which leads to indiscriminate felling of trees and accelerates water loss and soil erosion. (ii) Available resources of forest coverage are decreasing, and quality is degraded, ecological functions are weakening. The furniture industry of Jiangxi Province is relatively developed, but backward management method leads to excessive felling of trees and serious damage of natural vegetation, as well as deterioration of ecological environment. (iii) Mineral resources of Jiangxi Province are rich, but there is problem of excessive development, and the technology is not adequate during development. As a result, resource utilization level is low, and there is serious waste of resources. Waste residue, waste water and waste gas generated during development seriously pollute ecological environment. (iv) The diversity of wild plants and animals is greatly threatened. Due to shrinkage of natural broad-leaf forest and degradation of stand quality, ecological space of

wild plants and animals is increasingly shrinking. What's worse, unreasonable development and use of wild plants and animals lead to significant decline of quantity of population of wild plants and animals, and rare wild plants and animals under the state protection become endangered.

**2.2.2** Unreasonable industrial structure hinders ecological and environmental construction. Jiangxi Province is backward in economic growth mode, and unreasonable in industrial structure. According to incomplete statistics, by the end of 2009, the percentage of primary, secondary and tertiary industries of Jiangxi Province was 14.4%, 51.2%, and 34.4%. Compared with the national average level, the primary industry was 4.1 percentage points higher, the secondary industry was 4.9 percentage points lower, and the tertiary industry was 9 percentage points lower. These indicate that the industrialization of Jiangxi Province is still relatively backward. Besides, internal structure of three industries is not reasonable. In 2009, farming, forestry, husbandry and fishing in the primary industry accounted for 42.1%, 9.35%, 13.3%, and 31.2% respectively. The internal structure of primary industry concentrated on farming, mainly grain production, leading to out of balance of internal sectors, deterioration of ecological environment and low economic benefits. In the secondary industry, industries and building industry accounted for 41.8% and 9.4% respectively. The secondary industry was mainly the industries, within which light industries and heavy industries accounted for 33.5% and 66.4% separately, taking on heavy trend. Heavy industries contributed a lot to GDP growth of Jiangxi Province, but products of heavy industry were mainly preliminary processed products, few were deep processed products, taking on characteristics of high industrial energy consumption, serious pollution, and high ecological cost, and low economic benefits. In the tertiary industry, service industries of Jiangxi Province were still traditional wholesale and retailing businesses, mainly catering, communication and transportation industries. New tertiary industries, such as financial and insurance, information, consultation, science and technology, were underdeveloped, and service fields were narrow and remained at low level. These indicate that industrial structure of Jiangxi Province lagged behind the national average level, and the internal structure was not reasonable.

**2.2.3** Ecological protection awareness is weak and affects ecological and environmental protection. Jiangxi Province is an old revolutionary base area. There is excellent tradition of hardworking and thrift. However, due to historical, realistic, social and economic factors, people's ecological protection awareness is not strong, mainly manifested in following aspects. (i) Focusing on development but neglecting protection, and focusing on construction but neglecting maintenance. Backward economic growth mode and unreasonable industrial structure lead to predatory and extensive development and use of resources, consequently exceeding carrying capacity of ecological environment. (ii) Excessively stressing engineering measures but neglecting biological measures in the process of economic construction, leading to gradual reduc-

tion of biological diversity, accordingly influencing quality of ecological environment. (iii) Insufficient input in protection and construction of ecological environment for a long term. Although there are supporting policies, the fund input and amount are insufficient. (vi) The guiding policy of "priority to protection, emphasis on prevention, integrated governance, public participation and liability assumption" is not carefully implemented in management of ecological environment construction. Also, legislation is not well established. In addition, with economic growth, people's demand for physical life quality is increasing. There is the trend of unrealistic comparison and extravagance and waste. Rubbish thrown everywhere is also an essential factor influencing quality of ecological environment.

### 3 Connotation of low carbon economy and principle of ecological and environmental protection

In 2003, the White Paper *Our Energy Future-Creating a Low Carbon Economy* issued by British government firstly proposed the concept of low carbon economy<sup>[4]</sup>. Low carbon economy is an economy based on low carbon power sources that therefore has a minimal output of greenhouse gas emissions into the biosphere, but specifically refers to the greenhouse gas carbon dioxide. The aim of a low carbon economy is to integrate all aspects of itself from its manufacturing, agriculture, transportation, and power-generation, etc. around technologies that produce energy and materials with little greenhouse gas emission, and, thus, around populations, buildings, machines, and devices that use those energies and materials efficiently, and, dispose of or recycle its wastes so as to have a minimal output of greenhouse gases, realize sustainable social, economic and resource development. Protection of urban ecological environment should stick to the following principles.

**3.1 Integrating economic development and environmental protection** In the process of urbanization, it is required to properly treat the relation between economic construction and environmental protection, bring into full play ecological restoration function of forest ecological system, protect existing forest and grass, prevent new damages, and protect ecological environment, and promote economic development through protecting ecological environment, to realize mutual promotion of urban economic benefits and ecological and environmental benefits.

**3.2 Integrating scientific planning and green environment construction** Urban ecological environment construction plan should be included into urban overall plan, to establish forest ecological system with "scientific positioning, reasonable distribution, ecological priority, and conforming to nature, integrating urban and suburban areas". Green network should be configured according to points, lines, and areas, to establish urban living environment of "city being in the forest, roads in the green, and people in landscape". Protection and construction of ecological environment involve many aspects of economy and society. It is a complex and systematic project. Thus, it is required to make overall

and objective analysis of current situations, causes of deterioration, degree of damage, and development trend of urban ecological environment, carefully summarize experience of ecological and environmental protection and construction, integrate urban ecological construction and economic development, give prominence to main points, and make overall plan for urban ecological and environmental construction as early as possible. Besides, it is required to combine forest and water, realize coordination between urban green ecological environment and urban regional environment, and harmony between ecological functions and green projects.

**3.3 Relying on science and technology and suiting measures to local situations** Ecological and environmental construction and protection should follow natural laws and economic rules, suit measures to local situations, take simultaneous measures, and break the administration of acting willfully regardless of overall interest. Besides, it is required to attach great importance to increasing scientific and technological content of ecological and environmental construction, greatly promote mature scientific and technological achievements, and set up a good many science and technology demonstration bases with high starting point and high standard, to bring into full play radiating and driving functions. According to urban overall plan and characteristics of ecological environment, it is required to select trees with high adaptation and resistance to pollution, implement green projects in every possible place, and build complex structure plant population, to fully reflect urban characteristics<sup>[5]</sup>.

**3.4 Raising funds through many channels to realize sustainable development** Improving urban ecological environment is a large-scale social public welfare undertaking. China should be determined to increasing fund input in construction and protection of urban ecological environment. Besides, it is required to further adjust financial expenditure structure. Financial institutions should constantly increase loans for construction of ecological environment. All levels of government should gradually increase input in urban ecological and environmental construction and protection from the perspective of sustainable development. In addition, it is required to establish preferential policies and incentive mechanism, to attract social investment, to establish an investment pattern with multiple subjects, so as to ensure funds for urban ecological and environmental construction and protection are put in place.

## 4 Recommendations for ecological and environmental protection of Jiangxi Province

Ecosystem is a compound system containing many factors. The quality of ecological environment directly determines living quality of residents and restricts social and economic development. Therefore, we should protect ecological environment, stop damage of ecological environment, develop low carbon economy, promote reasonable use of natural resources and innovation of science and technology, realize benign cycle of ecosystem, and ensure sustainable development of economy and society<sup>[6]</sup>.

**4.1 Raising the awareness and advocating low carbon life and ecological and environmental protection** In order to better protect urban ecological environment, we should undertake propagation of ecological and environmental protection, advocate low carbon life, cultivate low carbon awareness of all people, and innovate upon low carbon consumption culture. (i) It is recommended to launch ecological and environmental protection day, such as Car-free Day, and strengthen propagation of ecological and environmental protection. (ii) It is recommended to bring ecological and environmental protection to classroom, and take it as part of ideological and political course. (iii) It is recommended to bring into full play functions of radio, television, newspaper, magazine, and Internet, to educate and train the masses in energy conservation and green consumption. For example, various education and training may be carried out in both urban and rural areas, to create excellent atmosphere of joint protection and reasonable development and use of ecological resources.

## 4.2 Transforming the economic growth mode, developing low carbon economy, and protecting ecological environment

The core issue for transforming the economic growth mode is the issue of quality of economic development, namely the issue of economic benefits<sup>[7]</sup>. It is recommended to transform the economic growth mode, change the extensive growth mode to intensive growth mode, optimize energy and resource utilization manner, increase energy utilization efficiency, and actively develop alternative energy and renewable energy, to realize low carbon economic development. In transforming the economic growth mode, we should properly treat the following relationships: (i) the relationship between speed and benefits, (ii) the relationship between epitaxy and connotation, (iii) the relationship between economic aggregate and overall quality, (iv) the relationship between extensive and intensive management, and (v) the relationship between present benefits and long-term benefits. In practice approaches, we may take following measures. (i) Developing agriculture with high yield, high quality and high efficiency, and characteristic agriculture. Agriculture is foundation of national economy and the essential precondition for existence and development of other industries. (ii) Vigorously developing service industries, especially modern service industry, and actively supporting and developing green industries, increasing core competitive power of products, and gradually eliminating enterprises with high pollution, to realize low carbon development of social economy. (iii) Developing circular economy. To solve the problem of environmental pollution, we must take use of advantages, develop green economy and tourism economy, comprehensively promote circular economy and clean production, improve ecological quality of economic management, realize win-win of ecology and economy, and establish a recycling system of "resource-product-regenerated resources-regenerated products", to realize resource-based and reducing and damage-free agricultural production and urban wastes.

**4.3 Optimizing industrial structure and promoting economic growth to protect ecological environment** Adjustment of in-

dustrial structure is the key. In the process of social transformation, adjustment of industrial structure should not be carried out just for once, and should not be reached at a single leap. It should be carried out gradually and step by step. Adjustment of industrial structure should catch the market direction, to further change to strengthening overall strength of national economy, building powerful economic support system, improving extensive economic growth mode, and improving overall quality of national economy, and promoting upgrade of industrial structure. Firstly, it is recommended to develop and strengthen basic industries, pillar industries, and key enterprises, and green products. Secondly, it is recommended to accelerate technological transformation of secondary industry relying on scientific and technological progress and applying new high technologies. Thirdly, it is recommended to vigorously develop tertiary industries, including trade and business, finance, insurance, information, tourism, and intermediary services. Optimizing industrial structure is favorable for stopping degree and scale of resource consumption and waste discharge, and also favorable for increasing resource utilization efficiency and realizing transformation of economic growth mode, as well as harmonious development of economy and environment. Therefore, it is recommended to optimize industrial structure and realize upgrade of industrial structure.

**4.4 Improving property right system and reinforcing law enforcement to protect ecological environment** It takes a long time to cultivate environmental protection awareness, optimize industrial structure, transform economic growth mode, develop circular economy, and realize green GDP. However, it is fast to restrict discharge and emission of wastes through rules and regulations such as property right. Therefore, it is necessary to improve the property right system, and confirm and treat relationship between responsibilities, rights, and benefits through the property right system, and establish a property system with clear property ownership, well defined power and responsibility, strict protection and smooth circulation, to protect ecological environment. Besides, it is recommended to further strengthen the law enforcement of environmental administration, actively promote environmental administration law enforcement responsibility system and examination and review system, to comprehensively promote administration in accordance with laws. In addition, to encourage all people to protect environment, in cooperation with competent legislation authorities, Jiangxi Environmental Protection Department undertook propagation and education of *Environmental Protection Law of the People's Republic of China*, *Forest Law of the People's Republic of China*, *Law of The People's Republic of China on Water and Soil Conservation*, *Law of the People's Republic of China on the Protection of Wildlife*, *Regulations of the People's Republic of China on Nature Reserves*, *Regulations of Jiangxi Province on Management of Wild Plants*, *Regulations of Jiangxi Province on Wildlife Nature Reserves*, *Regulations of Jiangxi Province on Management of Wetland Protection*, to constantly raise people's awareness of legal system, and learn, understand and protect laws, and to jointly make

contribution to protecting ecological environment.

#### **4.5 Making scientific environmental protection plan and establishing evaluation system to protect ecological environment**

To do a good job in construction of green ecological environment, there should be plan firstly. When making overall plan, there should be plan for green ecological environment. Besides, it is recommended to make adjustment of green plan on the basis of the indicator evaluation system, and make transformation of green land already built according to the adjusted plan. The plan for green ecological environment construction should be coordinated with overall plan and surrounding environment, to safeguard seriousness of plan, and ensure satisfaction of construction of green ecological environment. Furthermore, at the same time of developing economy, it is recommended to pay close attention to protection and improvement of ecological environment, promote rapid development of economy at minimum ecological cost. Therefore, it is recommended to change the economic growth mode that only pursues GDP growth and political performance assessment system of local government, include the indicator of ecological and environmental construction and economic development indicator into political performance assessment system of local government. Through adjustment of the baton of political performance assessment, it is expected to strengthen awareness of local government for construction of ecological environment and promote coordinated development of economy and ecological environment.

#### **4.6 Strengthening cooperation of departments and promoting economic development to protect ecological environment**

Ecological environment construction is a trans-regional, trans-departmental, and trans-industry comprehensive and systematic project. It needs comprehensive coordination and close cooperation of all related departments. It is recommended to formulate pertinent measures for ecological and environmental protection, take reasonable environmental protection as precondition, while reasonable protection goal should be coordinated, livable, and classified guiding system. The coordination should focus on the relationship between urban resources, environment, ecology and social economy, integrating environmental protection of urban and rural areas. Livable principle should be manifested in humane caring, actual effect of environmental protection input, and satisfying demands for clean environment. Classified guiding should suit measures to local conditions, and objectively treat the regional differences of overall development of urban and rural areas. To satisfy these conditions, it needs comprehensive coordination and close cooperation of all departments. Therefore, Jiangxi Province should take the national ecosystem construction plan as principle, while all local regions should stick to the principle of suiting measures to local situations and formulate suitable ecological and environmental construction plan. Besides, it is required to take consideration of actual situations of all departments and regions, make comprehensive coordination and close cooperation. In addition, to ensure effective implementation of measures, all levels of government should establish ecological and environmental construction responsibility

system, and incorporate ecological environment into the performance assessment, conduct regular inspection, and announce to the public from time to time. Leaders as an example should transform the criterion of taking economic growth as the single indicator to the assessment including ecological and environmental performance.

Current economic growth mode exerts huge impact on ecological environment. We must curb such situation, transform economic growth mode, vigorously develop low carbon economy, and strengthen ecological and environmental protection. This not only conforms to requirement of global climate cooperation, but also conforms to the sustainable development path. Sustainable development is a development mode widely accepted by both developing and developed countries. To realize sustainable development, we should ensure basic ecological process and keep the life maintenance system, and ensure continuous utilization of environment by human beings. Environmental protection is the key point for realizing sustainable development. For this, we should properly treat the relationship between economic development and environmental protection. In conclusion, developing the low carbon economy in Jiangxi Province is of great significance.

(From page 45)

## References

- [1] CHEN J, SONG M, XU L. Evaluation of environmental efficiency in China using data envelopment analysis[J]. *Ecological Indicators*, 2015 (52): 577–583.
- [2] DOGANAY SM, SAYEK S, TASKIN F. Is environmental efficiency trade inducing or trade hindering[J]. *Energy Economics*, 2014(44): 340–349.
- [3] WOO C, CHUNG Y, CHUN D, *et al.* The static and dynamic environmental efficiency of renewable energy: A Malmquist index analysis of OECD countries[J]. *Renewable & Sustainable Energy Reviews*, 2015 (47): 367–376.
- [4] LEE KH, MIN B, YOON KH. The impacts of carbon (CO<sub>2</sub>) emissions and environmental research and development (R&D) investment on firm performance[J]. *International Journal of Production Economics*, 2015, 167:1–11.
- [5] ZHOU G, CHUNG W, ZHANG X. A study of carbon dioxide emissions performance of China's transport sector[J]. *Energy*, 2013, 50(1):302–314.
- [6] YAO X, ZHOU H, ZHANG A, *et al.* Regional energy efficiency, carbon emission performance and technology gaps in China: A meta-frontier non-radial directional distance function analysis[J]. *Energy Policy*, 2015, 84:142–154.
- [7] ZHANG N, CHOI Y. Total-factor carbon emission performance of fossil fuel power plants in China: A metafrontier non-radial Malmquist index a-

## References

- [1] State Forestry Bureau. Forest Resources Statistics of China[M]. State Forestry Bureau, 2009. (in Chinese).
- [2] National Bureau of Statistics of the People's Republic of China. China Statistical Yearbook[M]. Beijing: China Statistics Press, 2009. (in Chinese).
- [3] LIU QL, CHEN YF. An assessment of the urban eco-environment quality in Fuzhou City[J]. *Journal of Fujian Teachers University(Natural Science)*, 2006, 22(1): 112–116. (in Chinese).
- [4] FENG R, CHEN SJ. Research on the situation and development of low carbon economy in Guangzhou[J]. *International Economics and Trade Research*, 2010, 26(7): 67–72. (in Chinese).
- [5] CHEN XG, YANG Y. Considerations about and suggestions on creating the forest city in Nanchang City[J]. *Sci-Tech Information Development & Economy*, 2009(15): 104–106. (in Chinese).
- [6] LAI YB, XIE W. Research of urban eco-environment situation of Fushun and its control countermeasures[J]. *Environmental Protection Science*, 2002, 28(2): 36–38. (in Chinese).
- [7] YANG FH, ZHAN Q, WANG PH. Thinking on changing economic growth mode of Jiangxi Province[J]. *Prices Monthly*, 2009(12). (in Chinese).
- [8] LI A, ZHANG Z, ZHANG A. Why are there large differences in performances when the same carbon emission reductions are achieved in different countries[J]. *Journal of Cleaner Production*, 2014, 103: 309–318.
- [9] FARRELL MJ. The measurement of productivity efficiency[J]. *Journal of the Royal Statistical Society*, 1957, 120(3):377–391.
- [10] CHARNES A, COOPER WW, RHODES E. Measuring the efficiency of decision making units[J]. *European Journal of Operational Research*, 1978(2): 429–444.
- [11] FARE R, ZHANG Z. Productivity growth, technical progress, and efficiency change in industrialized countries[J]. *American Economic Review*, 1994, 84(1):66–83.
- [12] CHUNG YH, FARE R, GROSSKOPF S. Productivity and undesirable outputs: A directional distance function approach[J]. *Microeconomics*, 1995, 51(3):229–240.
- [13] YANG L, OUYANG H, FANG K, *et al.* Evaluation of regional environmental efficiencies in China based on super-efficiency-DEA[J]. *Ecological Indicators*, 2014, 51:13–19.
- [14] O' DONNELL CJ, RAO DSP, BATTESE GE. Metafrontier frameworks for the study of firm-level efficiencies and technology ratios[J]. *Empirical Economics*, 2008, 34(2): 231–255.
- [15] CHIU CR, LIOU JL, WU PI, *et al.* Decomposition of the environmental inefficiency of the meta-frontier with undesirable output[J]. *Energy Economics*, 2012, 34(5):1392–1399.