Perspective of Chinese Forest Carbon Absorption Trade Based on Low-Carbon Economy

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Abstract The paper analyzes the basis of forest carbon trade including the feasibility of carbon absorption trade, main body, platform and standard. The purposes of capital of carbon absorption trade is introduced. Caron absorption trade capital can be used to resettle ecological migrants, absorb employment, build forest and increase fund, increase local income, enhance forest science and technology development and launch environmental proportion. The perspective of developing forest carbon absorption trade is pointed out and the practical problems of developing forest carbon trade need to be solved. For example, the property problem of forest resources, value calculation problem of forest resources and sustainable development of forest.

Key words Low-carbon economy, Forest carbon absorption, Trade, China

Low-carbon economy is an economic development form with low energy consumption, low pollution and low waste emission. At present, the environmental pollution is increasingly serious and low-carbon economy has become the only way for sustainable development of human beings. Forest is the largest carbon resource in land ecological system and it has the functions of absorbing carbon dioxide, storing carbon dioxide and maintaining ecological diversity. Forest carbon absorption belongs to the one of the biological carbon absorption technologies. The major functions of forest are that the rich plants in forest can absorb carbon dioxide through photosynthesis; release oxygen fix carbon dioxide to plant and soil; regulate temperature, moisture content, evaporation and precipitation. Besides, forest plays an important role in diluting green house gases and alleviating global warming. The process of it is called "absorption". As an economical "carbon absorption" approach, forest absorption will become a major measures on confronting with climate change under the background of low-carbon economy. The basis on the forest carbon absorption trade is expounded and the uses for the capital of forest carbon absorption trade are introduced. In addition, the perspective and imperative practical problems in the development of Chinese carbon absorption trade are pointed out.

1 Basis for the forest carbon absorption trade

1.1 Feasibility of forest carbon trade

1.1.1 Forest carbon trade has realized the equal value As the specific carrier of the emission space of carbon dioxide, forest is an intangible resources. The real situation is that under the situation of zero ecological compensation and insufficient ecological compensation, the polluters enjoy the interests of ecological environment and take the relevant responsibilities. The environmental protectors fulfilled the responsibility of environmental protection and some even sacrificed their possible developmental opportunity, but they could not get their due compensation. But the carbon absorption trade can realize the equal value to a certain degree, which unified human rights and responsibilities. According to the principle of " who get benefits who pay and who is damaged who get the compensation", the polluters bear more costs and the environmental protectors get more green wealth[1].

1.1.2 Carbon absorption trade provides new capital collecting channels for forestry development. The existing compensation system of forest ecological interests in China stipulates that the compensation is paid by the nation. Limited by the national finance, the compensation standard is low and indiscriminative, which can not fully display the value of forest ecological service and it is hard to absorb investors to enter ecological forest. The carbon absorption has the opportunities to realize the compensation of forest ecological interests through market mechanism to make up the shortage of political compensation given by the government to owners and open new capital collecting channels for forestry development so as to increase the Chinese forestry scale.

1.1.3 Forest carbon absorption has economic feature. As an approach for absorbing carbon, forest carbon absorption is economic. There are still large gap between the carbon emission price in carbon market (about 10 – 20 dollars/t) and the economic losses caused by carbon emission to world economy (about 50 – 120 dollars/t). It accounts for the popularity of forest carbon absorption items in the international community. In addition, the development of forest has not only low costs and good interests, but also can clarify air, protect water sources, fix soil, prevent deforestation and maintain biological diversity to create comfortable living environment for biology on the earth. For example, since 2004, the Brazil has established the

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conservation area with the area of more than 20 million hm^2 in the Amazon Basin. According to the prediction, if the conservation area is well managed, by 2015, the area will avoid more than 1 000 t of organic carbon emission caused by cutting forests and will provide sufficient precipitation and fresh oxygen for numerous countries in America[2].

1.2 Main body of carbon absorption trade The narrow sense of carbon absorption trade refers to the forest establishment and forest reestablishment items of clean development mechanism(CDM). It is a virtual trade created by law on the basis of *United Nations Framework Convention on Climate Change* and according to the carbon emission index of each member country stipulated by the United Nation in *Kyoto Protocol*. The developing countries transfer their volume checked carbon dioxide emission to developed countries to commute the emission reduction responsibilities of developed countries stipulated by Kyoto Protocol. In strict legal sense, the main bodies of clean development mechanism are contracting countries *United Nations Framework Convention on Climate Change*. The main body of carbon trade is country. I think that in the future the scope of carbon trade will be further expanded, which will include the emission certification trade and narrow carbon absorption trade. Besides that, the emission reduction and forest carbon should be combined together. The carbon absorption trade can not only be among countries, but also among enterprises and individuals and owners of forest resources.

1.3 Platform of carbon absorption trade China has clearly indicated that taking increasing carbon absorption as an important measure for increasing foreign exchange. But in terms of how to organize forest carbon and how to trade, there is no clear definition. China Forestry Property Exchange, which will be the first one in china with forest carbon absorption trade, launches the domestic forestry business, bulk purchase and sell of wood and forestry products, financial services of forest and related forestry enterprise and the businesses of carbon absorption trade and international forestry resources trade. The National Development and Reform Commission, National Forestry Bureau, governments at various levels, enterprises and private organizations are all positively to construct the information exchange platform of carbon absorption and organize the pilot projects of carbon absorption.

1.4 Standards of carbon absorption exchange In order to establish the carbon absorption trade, the standard of establishing carbon commodities should be fostered to measure, supervise and retrace the "carbon" in each carbon item, and then the commodities can be circulated in market. Due to the different types of trees, growth year and different carbon-fix caused by different soil qualities, the measures on carbon is very difficult. The Kyoto Protocol has made strict stipulation on carbon absorption of commutating carbon emission. The carbon forest item should go through strict design, examining, measurement and certification, or else, the carbon absorption caused by ordinary forest and low efficient forest can not be exchanged.

So, before undertaking carbon trade, five sections-productive standard, standard measurement of carbon absorption, certification standard of carbon absorption (examination and check standard), trade rules and trade standard should be clarified. So far, whether the domestic and foreign trade uses the unified standard, which department is used to stipulate and execute the rules, which departments are responsible for the third-party certification, certification standards and how to make the standards still needs to be determined.

2 Purposes of carbon absorption capital

2.1 Ecological migrants The forestry regions are often characterized by inconvenient transportation, uninformed situation, limited farmland and backward economy. Out of protecting green resources, the survival road of local farmers is narrow. By using the trade capital to conduct ecological migrant can improve local residents' living condition and move them to a better place. The capital can be used to return farmland to forest, reduce the damage of human activities, expand the living space of animals and plants and avoid the long during situation of severe deforestation. The government can compensate migrants by the way of allocating land, capital, houses, cashes and employment.

2.2 Absorption employment Forestation, protecting forests and fully making use of carbon absorption functions of forests are the important measures for countering climate change. The quality of trees directly affects the carbon absorption capability of forest. If the forest can not be well protected and fire accidents and pest accidents happen, the forest will not be able to absorb carbon, on the contrary, it may emit carbon. The protection and management of animals and plants, scientific plantation and cutting of woods, prevention and control of forest fire, pest and diseases all can not do without the interference of human beings. So, the profits from carbon absorption trade can be used to absorb personnel employment to intensify the forestry management.

2.2.1 Forest protector and information recorders. Forest protectors and information recorders take the responsibility of examining and protecting forest, observing and recording animals and plants, preventing fire disaster and geographic disasters and preventing and controlling pest and disasters.

2.2.2 Seeding nursery workers and woodsman. The sustainable and scientific development of forest can not separate from excellent seeding nursery workers and woodsman.

2.2.3 Tourism related personnel. The tourism related personnel mainly undertakes the businesses of tourism service, exploration, tourist assistants and environmental promotion, *etc*.

2.3 Establishing forest to increase foreign exchange The research show that every one square kilometer growth of plants in forest will absorb 1.83 t of carbon dioxide in average and emit 1.62 t of oxygen. Chinese government pays much attention to the restore and protection of forest coverage, which makes China have the rapist speed of resuming forest coverage and have the largest area of man-made forests.

The carbon absorption trade is expected to make up the insufficient of governmental compensation to forestry economy through market trade and provide new engine for forestry devel-

opment. Local governments can implement the measurement on carbon absorption and supervision on forest establishment in the process of forest establishment and growth of forest to increase the carbon absorption of forest. Through certification and registration, the wood can be transferred from products to commodities.

2.4 Increasing local income Most forests are owned by the state and the government, so the realization of value of forest resources through market trade and green forests change into green wealth can not only increase local financial income and alleviate the governmental burden on compensating public welfare forest, but also can benefit local residents and improve people' enthusiasm on protection forest resources.

2.5 Intensifying the research and development of forestry technology The wholesome development of forest depends on the scientific technology and management. So the trade income should be used to introduce into advanced technology in forest construction and management; intensify technology support on carbon absorption forest and research woods with strong carbon-fix capability an the scientific way of planting forests and preventing of pest and disasters to improve the productivity and carbon-fix capability of Chinese forest, especially, the man made forest.

2.6 Launching environmental protection promotion The final aim of carbon absorption trade is to spread low carbon green idea; promote environmental protection; improve public awareness on low carbon and appeal people to protect environment and reduce carbon emission.

3 Perspectives and imperative practical problems of forestry carbon absorption trade

3.1 Perspective of carbon absorption trade The international community pays increasingly importance on carbon absorption functions of forests. Many counties and international organizations adopt forceful measures vigorously, including establishing forests, restoring ecological system, establishing agricultural and forestry compound system, intensifying sustainable management of forest and intensify the land carbon absorption volume. Chinese government lays great importance on it forestry development. On December of 2009, the president Hu jin-tao emphasized in the UN climate change summit that China should increase the forestry resources and enhance carbon absorption of forest. By the year of 2020, China will try to increase 40 million hm^2 of forest comparing with that in 2005 and the forest reserves will increase 1.3 billion square meters comparing with that in 2005.

At present, Chinese carbon absorption trade is still in the starting stage and the relevant trade policies have not been launched. The establishment of carbon absorption trade is a very complex project with intricate road but optimistic future. Nowadays, the carbon absorption trade of each place develops gradually. The Chinese carbon absorption item launched jointly by Chinese State Forestry Administration and Land and Environment Ministry of Italy is located in Aohan Qi, Chifeng City of Inner Mongolia. The two parties contract that in the first effective five year, the Italy will invest 1.53 million dollars and establish 3 000 hm^2 of forest in sand in Aohan Qi. The certificated carbon reduction index produced by the item is possessed by the Italy. Sichuan Province sold the carbon absorption in the future 20 years produced by the new forests of 2 251.8 hm^2 in its northwest area to Asian company of Hong Kong low carbon company. On 22nd, April of 2011, the first carbon absorption fund was established in Guangdong Province. The first start – up fund was 10 million yuan, the fund will be used to building ecological forest; maintain biological diversity and establish the platform of "carbon credit"[3].

3.2 The practical problem of carbon absorption trade The group awareness of "low carbon" has been awakened, so the market and normalization should be followed closely. The carbon absorption trade should have clear property, strict additionality and avoid linking. Besides, it should follow the international measurement, supervision, and checking and registration rules. The most important thing is that it should have buyers.

3.2.1 Problem of the property of forest resources. The prerequisite of carbon absorption trade is a clear property right. Only by clarified the property rights and changed the gratuitous occupation and use of resources, the inner mechanism of effective use of resources can be established completely to promote the capitalization and market process of resources.

The reserve of forest resources is the carrier of forest carbon absorption and the forest carbon absorption resource ownership should be parallel with forest resource ownership. With the existing forest in China, its externality of ecological interests makes the carbon absorption to be "public goods" without clear ownership. In terms of ownership definition, the rules should be stipulated and then to measure, certificate and register. At last, the products can be changed to commodities to trade in market[4].

In addition, the carbon absorption forests should have strict additionality, that is to say, the carbon absorption forests should be specially for reducing green house gases emission. The forest item, which is not constructed as the standards of carbon absorption forest can not be used for exchanging.

3.2.2 Calculating on the value of forest resources. The value of resources is the specific reflection of economic interests of resource ownership. The value is determined by the factors of usefulness, scarcity and developmental situation of natural resources to human beings. The calculation on forest carbon absorption is the fundamental work of forest carbon exchange, as well as important measure for perfecting capital management, realizing resource value and resource industry development. The evaluation on the value of forest resources should have a resource calculation system. The third party certification and registration is also needed. On the basis of scientific quantitative measures and certification, the trade mechanism and market supervision mechanism should be gradually perfected.

3.2.3 Sustainable development of forest. Realizing forest carbon absorption through forest carbon absorption needs the

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land use of all towns in Rong Town is all relatively small, ranging from −0.155 to −0.438, and there is a slight difference among them. The towns with prominent characteristics of diversification of land use in Rong County have low degree of centralization of land use, and relatively big combination number of land use type, while the towns with inconspicuous characteristics of diversification of land use in Rong County have high degree of centralization of land use, and relatively small combination number of land use type. There is small quantity of combination types of land use in the study area. On the whole, the combination type of land use is farmland-woodland-other agricultural use land. The land use type in 21 towns of Rong County is mianly the farmland, and the area of farmland has a large proportion, accounting for 40.09% of the total area of land in Rong County, with outstanding dominant position of agriculture.

Second, there are abundant types and amount of agricultural land resources in the study area with the geographic significance, and there is ample untapped land. Amid 27 towns in Rong County, the farmland in 15 towns, such as Shuangshi Town, Wangjia Town, Lede Town, Guoshui Town and so on, has relative geographic significance; the garden plot in 11 towns, such as Xuyang Town, Changshan Town, Laimou Town, Shuanggu Town and so on, has relative geographic significance; the woodland in 11 towns, such as Dingxin Town, Hekou Town, Guwen Town, Changshan Town and so on, has relative geographic significance; other agricultural use land in 13 towns, such as Shuangshi Town, Wangjia Town, Lede Town, Hekou Town and so on, has relative geographic significance; the untapped land in 9 towns, such as Xuyang Town, Lede Town, Xinqiao Town, Zhengzi Town and so on, has relative geographic significance. But the composite index of land use in all towns is all smaller than 300, the comprehensive land use degree is not high and the holistic function of land is relatively fragile.

Therefore, the quantified analysis results of characteristics of land use structure in this paper can provide the scientific basis for the rational use of land resources and formulation of relevant policies in Rong County, and meanwhile, be of significance in guiding practice to much extent in some similar regions.

References

[1] WANG SQ, ZHOU Y, DONG YH, *et al.* Design and applications of land resources and ecological environment information system[J]. Pedosphere, 2002, 12(4): 373−381.
[2] LU YG, JIN YL, XU YQ. Towards land change science − the progress of LUCC[J]. China Land Science, 2006, 20(1): 55−61. (in Chinese).
[3] ZHU HY, LI XB. Discussion on the index method of regional land use change[J]. Acta Geographica Sinica, 2003, 58(5): 643−650. (in Chinese).
[4] HUANG QX, SHI PJ, HE YC, *et al.* Scenarios simulation land use change in the Northern China by system dynamic model[J]. Acta Geographica Sinica, 2006, 61(12): 1299−1310. (in Chinese).
[5] LIU YS, WANG JY, GUN LY. GIS−based assessment of land suitability for optimal allocation in the Qinling Mountains, China[J]. Pedosphere, 2006, 16(5): 579−586.
[6] LIU RX, XUE A, HAN P, *et al.* Optimization of landuse structure: commentary of methods[J]. Acta Scientiarum Naturalium Universitatis Pekinensis, 2005, 41(4): 655−662. (in Chinese).
[7] SU W, CHEN YH, WU YF, *et al.* Research on land use pattern optimization of simulation at ecological security level − taking ecotone between agriculture and animal husbandry in Northern China as an example[J]. Progress in Natural Science, 2006, 16(2): 207−214. (in Chinese).
[8] ZHOU SL, HUANG JS. Study on division of regional land − use structure in the coastal area of low mountains and hills in southeastern China − a case study in Wenzhou city[J]. Acta Pedologica Sinica, 2003, 40(1): 37−45. (in Chinese).
[9] TAN YZ, WU CF. The laws of the information entropy values of land use composition[J]. Journal of Natural Resources, 2003, 18(1): 112−117. (in Chinese).
[10] WANG Y, DENG LJ. Quantitative structural analysis of land use and study on land sustainable utilization in Sichuan Province[J]. Journal of Sichuan Agricultural University, 2006, 24(2): 194−200. (in Chinese).
[11] WANG HM, WANG XY, LI H. Land utilization situation in Heilongjiang Province based on quantitative geography model[J]. Transactions of the Chinese Society of Agricultural Engineering, 2006, 22(7): 70−74. (in Chinese).
[12] ZHANG XB. Research for division of regional land − use structure in the East Gansu Loess Plateau[J]. Research of Agricultural Modernization, 2005, 2(11): 435−439. (in Chinese).
[13] XU JH. Measurement of Geography[M]. Beijing: Higher Education Press, 2006. (in Chinese).
[14] CHEN QC, LV CW, LI BC, *et al.* Quantitative analysis of land use structure characteristics at county scale[J]. Transactions of the Chinese Society of Agricultural Engineering, 2009, 25(1): 223−231. (in Chinese).
[15] ZHANG YF, WANG FL. Analysis on the structural changes of land utilization in a village[J]. Journal of Arid Land Resources and Environment, 2004, 18(6): 90−94. (in Chinese).

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sustainable development of forest. The sustainable development of forest needs to intensify forest operation, improve forest quality and promote carbon absorption. The scientific measures should be adopted to guarantee the healthy and sustainable development of forest, for example, by using the durable wooden products to replace the energy intensive materials; reusing the residues of cutting; controlling illegal cut; protecting wetland and forestry soil; well planning the cut and planting of trees; orderly planting trees; rationally cutting tress; promoting the benign circulation of forest. Besides, it should develop ecological tourism of forest and fully tap the ecological value of forest.

References

[1] ZHOU Q. Analysis of carbon trading system[J]. Legal System and Society, 2010(22): 113−114. (in Chinese).
[2] RHETT BUTLER. Amazon rainforest facing crisis, Globalization is expected to problem-solving[EB/OL]. (2007−09−26). http://cn.mongabay.com/news/2007/2007_0604−nepstad_interview.html. (in Chinese).
[3] ZENG S, LIN Y. The first carbon fund set up in Guangdong[N]. Yangcheng Evening News, 2011−03−22(02). (in Chinese).
[4] CHEN XC. Translate ecosystem services into carbon sequestration benefits[N]. First Financial Daily, 2010−07−28. (in Chinese).