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Progress of Eco-compensation in China

LIU Guihuan, WEN Yihui, WANG Xiahui, XIE Jing, MA Ya, ZHU
Yuanyuan



Foreword »

✦ Editor in Chief: Prof. WANG Jinnan



Since its opening-up and reform, China has been in the process of rapid economic development with its people enjoying an increasingly improved standard of life. Meanwhile accompanying this dramatic economic growth is the degradation of environment which has, to some extent, damaged the gains of the opening-up and reform and prevented the economy from a healthy and sustainable development. The Chinese government is increasingly aware of that without addressing the environmental issues it is facing now, will jeopardize its long term goal of the great rejuvenation of the Chinese nation. Given the magnitude and complexity of the environmental issues in China, there is no easy way in addressing them and the solution to them entails an equal priority being given to environmental protection, ecological conservation and economic development or even higher than the latter by mainstreaming the

former into the overall socio-economic decision-making process. As a matter of fact, China has been in the struggle against environmental pollution since the very beginning of its economic take-off and trying to explore a pathway that could help address China's environmental issues in the way most suitable to China's specific circumstances.

In recent years, especially since the 12th Five-Year Plan period, the enhanced measures including legislation, policy, regulatory and economic means have been taken by the Chinese government in dealing with environmental problems, of which environmental policies have played an important role in this regard. Corresponding to this situation and in meeting the demand of governments at different levels for environmental policy tools, the environmental policy research projects on topics of a wide range have been conducted by some Chinese

environmental research institutions including the Chinese Academy of Environmental Planning (CAEP).

CAEP founded in 2001, is a research advisory body supporting governments in the development of key environmental planning, national environmental policies, and major environmental engineering projects. In the past more than 10 years, CAEP has accomplished the development of the overall planning of national environmental protection for the 10th, 11th and 12th Five-Year Plan periods; water pollution prevention and control planning for key river basins; air pollution prevention and control planning for key regions; soil pollution prevention and control planning; and some regional environmental protection plans. In the same period of time, CAEP also actively engaged in research on such topics as green GDP, environmental taxation, emission trading, ecological compensation, green financing, etc. By so doing, CAEP has become an indispensable advisory body in the environmental decision-making in mainland China. According to *2013 Global Go To Think Tanks Report and Policy Advice* published by University of Pennsylvania, CAEP was ranked 31 in the field of environment in the world. Many of CAEP's research results and project outcomes regarding environmental policies have drawn great attention of decision makers and international institutions, and have been utilized to contribute to the formulation of national environmental policies concerned.

The Chinese Environmental Policy Research Working Paper (CEPRWP) is a new internal publication produced by CAEP for the purpose of facilitating the academic exchange with foreign colleagues in this field, in which the selected research papers on environmental policies from CAEP are set out on the irregular basis. It is expected that this publication will not only make CAEP's research results on environmental policies be known by foreign colleagues but also serve as a catalyst for creating opportunity of international cooperation in the field of environmental policies, and environmental economics in particular, with a view of both the academic research and practical policy needs.

The CPC Central Committee and the State Council attach great importance to eco-compensation. Since the 18th National Congress of the Communist Party of China, General Secretary, Xi Jinping put forward a series of new ideas, concepts and strategies on ecological construction and environmental protection. He made an important elaboration of "Lucid waters and lush mountains are invaluable assets", stressed the relationship need be correctly handled between economic development and ecological protection, and the idea shall be firmly upheld that the ecological protection is to protect the productivity and the ecological improvement is to develop the productivity. On December 2016, Xi Jinping made new vital instructions that the ecological civilization construction is a component of "5-in-1" overall

layout and "four-comprehensiveness" strategic layout. He stressed that the ecological civilization institution shall be deeply reformed, so as to set up the framework of ecological civilization systems as soon as possible. On March 2017, Premier Li Keqiang explicitly listed "to improve the main functional area system and eco-compensation mechanism" as an important component of the "deepening reform for promoting ecological civilization progress" in the "Government Work Report". Vice Premier Zhang Gaoli also made important instructions for several times on how to establish and improve the eco-compensation mechanism. In the report of the 19th National Congress of the Communist Party of China, "establish a market-based and diversified eco-compensation mechanism" are put as one of the important contents in the section of "accelerate reform of the ecological civilization system and build a beautiful China".

Since the "the eco-compensation policy shall be improved and the eco-compensation mechanism shall be established as soon as possible" was proposed in the Decision of the State Council on Implementing Scientific Outlook on Development to Strengthen Environmental Protection in December

2005 (GuoFa [2005] No. 39); some files, such as the CPC Central Committee and the State Council, as well as the government work report, explicitly specified the requirements to accelerate the establishment of eco-compensation mechanism. Both the NPC and CPPCC have listed how to establish the eco-compensation mechanism as one of key proposals of two sessions for many years, all of which reflect the social concerns on eco-compensation from all walks of life in China.

In recent years, all local governments and sectors are actively carrying out explorations in the field of eco-compensation in accordance with the deploy of the CPC Central Committee and the State Council, which have gained valuable experiences and also identified some problems, the gap still exists to the general requirements to accelerate the ecological civilization construction. Therefore, under the overall context of ecological civilization construction, we need systematically sort out the policies and practices of eco-compensation systems of which have been implemented, and analyze the outcomes and problems, so as to provide references to further improve the eco-compensation mechanism and ecological civilization construction.



Contents >>

1. History of Eco-Compensation in China	1
2. Significant Progress of Eco-compensation in China	5
2.1 The national eco-compensation institutions are preliminarily established	5
2.1.1 National eco-compensation institutional framework and development roadmap	5
2.1.2 The obvious spatial differentiation of eco-compensation in China	8
2.2 The eco-compensation policy is becoming mature in key ecological function areas	11
2.3 The positive breakthrough made in trans-provincial watershed eco-compensation	12
2.3.1 Overall progress of the trans-provincial watershed eco-compensation	12
2.3.2 Effectiveness of trans-provincial watershed eco-compensation	13
2.4 Comprehensive eco-compensation mechanism under being explored	16
3. Main Practices of Eco-Compensation	17
3.1 Financial incentive mechanism based on environmental improvement	17
3.2 Transfer payment mechanism based on ecological factor	19
3.3 Compensation mechanism oriented to the regional cooperation	21
3.4 Market-oriented compensation mechanism	22
4. Conclusions	23
Reference	25



1. HISTORY OF ECO-COMPENSATION IN CHINA

Experienced the phases of preliminary development, rapid development and full implementation, the eco-compensation policies in China have presently entered the in-depth promotion phase, and the national eco-compensation institutional framework has been established.

The initial phase (1985-1998): Chinese Government promulgated and enforced a number of laws on resources and environment, which provided a legal basis for the eco-compensation practices. In 1990, the State Council issued the **Regulations on Further Strengthening the Environmental Protection**, which put forward the environmental guideline of "the developer is liable for protection, the destroyer is liable for restoration, and the user is liable for compensation" and "the equal stress shall be laid on both development/utilization and protection /appreciation", and established the eco-compensation policy for the first time. The eco-compensation has broken the ice both in practice and legal level in China.

The development phase (1999-2005): Chinese Government launched a series of large-scale ecological project, such as returning farmland to forest, natural forest protection, and ecological protection and construction of natural reserves, which promoted the eco-compensation to a rapid development phase in China. Meanwhile, the CPC Central Committee and the State Council explicitly put forward the requirements on how to establish the eco-compensation mechanism. For example, **Some Opinions of the State Council on Further Promoting the Western Development** (GuoFa[2004]No.6) was issued in March 2004, which required "to establish the compensation mechanism for

ecological construction and environmental protection"; encourage all kinds of investors to input the ecological construction and environmental protection"; **Key Works of the State Council in 2005** (GuoFa[2005] No.8) was issued in April 2005, which stipulated: "to strengthen the administration of mineral resources development, rectify and regulate the order of mineral resources development, and improve the compensation mechanism for resource development & utilization and compensation mechanism for ecological restoration". In the Fifth Plenary Sessions of 16th Central Committee of the Communist Party in October 2005, the **Proposal on the Development of 11-Five Year Plan for National Economic and Social Development** (ZhongFa[2005] No.13) definitely put forward "to accelerate the establishment of eco-compensation mechanism according to the principle of "the developer is liable for protection, and the beneficiary is liable for compensation". This is the first time that Chinese Government proposed to establish the eco-compensation mechanism in form of the central file. In December 2005, the **Decision of the State Council on Implementing the Scientific Outlook on Development to Strengthen Environmental Protection** (ZhongFa[2005] No.39) was released, which required to improve the eco-compensation policy and establish the eco-compensation mechanism as soon as possible. The eco-compensation shall be incorporated into the central and local financial transfer payments, and the state and local governments can carry out the eco-compensation pilots respectively.

The full implementation stage (2006-2014): both NPC deputies and CPPCC members have put forward many suggestions and



proposals on the eco-compensation during the NPC and CPPCC every year; the government work report also attached great importance to it, even for some key files, including the "11th Five-Year" and "12th Five-Year" planning outlines, Key Works of the State Council, the Outlines of "11th Five-Year" and "12th Five-Year" National Planning on Environmental Protection, they all definitely stipulated that the eco-compensation mechanism shall be established. The ministries, such as the MEP (Ministry of Environmental Protection), MoF (the Ministry of Finance), NDRC (the National Development and Reform Commission), and MWR (the Ministry of Water Resources) are actively exploring and formulating the eco-compensation policies and carrying out the eco-compensation pilots. Some local governments have also begun to explore the eco-compensation mechanism and carried out the eco-compensation mechanism pilots; some provincial governments have established the eco-compensation mechanism in own province.

- In August 2007, the former SEPA (State Environmental Protection Administration) issued the **Guideline on Carrying out the Eco-Compensation Pilot** (HuanFa [2007] No.130)", which required that the local government shall gradually carry out the eco-compensation in four fields, including nature protection area, important ecological function area, mineral resource development and water environment protection, and establish the eco-compensation mechanism.
- In May 2008, the **Circular on the First Batch of Areas to Carry out Eco-Compensation Pilot** (HuanBanHan[2008] No.168) released by the MEP, which identified the first batch of 6 pilot areas to set up the eco-compensation mechanism, which marks a

big step of eco-compensation practice in China.

- In 2010, the **Regulations on Eco-compensation** was included in Category B legislative plan of the State Council, the NDRC led and organized the relevant ministries and commissions to promote the drafting of the Regulations.
- In March 2011, the **Outline of the 12th Five-Year Plan for National Economic and Social Development** was passed on the Fourth Session of the 11th National People's Congress, which made a special exposition on how to establish the eco-compensation mechanism, and required to study how to set up the national special fund for eco-compensation, promote the reserve system for sustainable development of resources-based enterprises, and actively explore the market-based eco-compensation mechanism, and speed up formulation and implementation of the **Regulations on Eco-compensation**.
- In October 2011, the State Council issued the **Opinions on Key Works to Strengthen the Environmental Protection** (GuoFa[2011]No.35), which pointed out: "accelerate to establish the eco-compensation mechanism and national eco-compensation fund, and expand the range of eco-compensation".
- In November 2012, the report of the 18th National Congress of the CPC definitely proposed to establish the systems for paid use of resources and eco-compensation which can reflect relation between market supply and demand, scarcity of resources, ecological value and intergenerational compensation.
- In November 2013, the **Decisions of**



CPC Central Committee on Several Major Issues about Comprehensively Deepening Reform listed how to accelerate construction of ecological system as a major issue to be urgently settled and main task of comprehensively deepening reform, and “to implement the systems for paid use of resources and eco-compensation” as a component of the construction of ecological system.

- The eco-compensation was also defined in Article 31 of the **Environmental Protection Law of the People's Republic of China** (amended) released in April 2014.

In-depth promotion phase (2015-): the eco-compensation mechanism has become the core system of ecological construction in China; the eco-compensation in China has reached a new level.

- In April 2015, the CPC Central Committee and State Council jointly issued **Opinions on Accelerating the Construction of Ecological Civilization** (ZhongFa [2015] No. 12), which incorporated “the sound eco-compensation system” as an important part of “the sound ecological system ”.
- In July 2015, the MEP and NDRC jointly issued the **Several Opinions on Implementing the Environmental Policy of the State Main Functional Areas** (HuanFa [2015] No. 92), which required to increase the environmental protection fund, financial transfer payment and eco-compensation intensity of development-prohibited/restricted areas, continuously promote the eco-compensation and evaluation system; focus on the incentives to ecological protection, develop and implement the scientific eco-compensation system and the special financial transfer payment system, so that the protector can receive appropriate compensation and incentives.
- In September 2015, the CPC Central Committee and State Council jointly released **Overall Scheme on Reform of the Ecological Civilization** (ZhongFa [2015] No. 25), which definitely put forward to “improve the eco-compensation mechanism”: to establish the systems for paid use of resources and eco-compensation of which can reflect the relation between market supply and demand, scarcity of resources, natural value and intergenerational compensation; explore how to establish the diversified compensation mechanism, gradually increase the transfer payment to the key ecological functional areas; formulate the measures for horizontal eco-compensation mechanism; and encourage the local government to carry out the eco-compensation pilot.
- In October 2015, the Fifth Plenary Session of the 18th CPC Central Committee passed the **Proposal of CPC Central Committee on Formulating the 13th Five-Year Planning of National Economic and Social Development**, which put forward to strengthen the incentive compensation, and establish the horizontal basin eco-compensation mechanism.
- In March 2016, the Fifth Plenary Session of the 12th NPC passed the the **Outline of the 13th Five-Year Plan for National Economic and Social Development of People's Republic of China**, which referred to eco-compensation for twice: “to establish the sound horizontal eco-compensation mechanism in the



regional watershed”, and “accelerate the establishment of a diversified eco-compensation mechanism” as the important content of **Chapter 10: Accelerate The Improvement of the Ecological Environment.**

- In March 2016, the **Opinions on Improving the Compensation Mechanism for Ecological Protection** (ZhongFa[2016]No.31) was approved on the 22nd session of the Leading Group of Overall Reform, which definitely put forward to improve the compensation mechanism in key ecological regions; promote the horizontal eco-compensation; accelerate setting up the eco-compensation criteria system, improve the accounting method and develop the compensation criteria in view of the regional characteristics; strengthen the evaluation on eco-compensation benefits; and deeply research on eco-compensation theory and subject of ecological service value. It is an important progress in the top-level design of eco-compensation mechanism in China, which draws a roadmap of institutional innovation for eco-compensation in China, and provides guidance for the eco-compensation practices in future.
- In December 2016, the MoF, MEP, NDRC, and MWR jointly issued the **Guidance on Speeding up the Construction of Horizontal Eco-Compensation Mechanism between the Upstream and Downstream Basin** (CaiJian [2016] No. 928), which explicitly stipulated to establish the horizontal eco-compensation mechanism for the inter-provincial watershed of which is mainly based on the local governments and guided by the Central Government.
- In February 2017, the General Office of the CPC Central Committee and the General Office of the State Council jointly issued **Several Opinions on Delimiting and Strictly Observing the Ecological Red-Line**, which explicitly required "intensifying the compensation for ecological protection".



2. SIGNIFICANT PROGRESS OF ECO-COMPENSATION IN CHINA

2.1 The national eco-compensation institutions are preliminarily established

2.1.1 National eco-compensation institutional framework and development roadmap

1) Establish the eco-compensation institutional framework

Article 31 of the **Environmental Protection Law of RPC** provided that: “The State shall establish and improve the ecological protection compensation system. The State shall strengthen the efforts in the financial transfer payment for ecological protection areas. The relevant local people’s governments shall allocate the ecological protection compensation fund and make sure such fund is used for compensating the ecological protection. The State shall guide the people’s governments at the areas benefiting from such system and the ecological protection areas to conduct the ecological protection compensation through negotiation or according to the market rules.” The **Opinions on Accelerating the Construction of Ecological Civilization** (ZhongFa [2015] No. 12) issued by the CPC Central Committee and the State Council put forward that: “the compensation mechanism shall be improved for ecological protection. The rights and obligations shall be scientifically defined for the ecological protector and beneficiary, the operation mechanism shall be accelerated to set up so that the ecological impairer compensates, beneficiary pays, and protector receives the rational compensation. The **Overall Plan**

on the Institutional Reform of Ecological Civilization (ZhongFa [2015] No.25) further provided: “to improve the eco-compensation mechanism; explore to establish a diversified compensation mechanism, gradually increase the transfer payments to key ecological functional areas, and improve the incentive & restraint mechanism linking the ecological protection effectiveness with capital allocation; and establish the horizontal eco-compensation mechanism which is mainly based on local compensation and supplemented by the Central Finance. At present, the NDRC is leading to formulate the **Regulations on Eco-compensation**, which the expert proposal has been formed and is being revised and improved now; the next step will be to solicit the opinions from relevant sectors, it is planned to report the Legislative Affairs Office of the State Council for review in 2017.

2) Define the roadmap of national eco-compensation development

the General Office of the State Council released the **Opinions on Improving the Compensation Mechanism for Ecological Protection** (GuoBanFa [2016] No. 31) to make the systematic and comprehensive deployment of eco-compensation; it also issued the **Letter to Agree on Setting up the Inter-Ministerial Joint Eco-Compensation Meeting** to establish the eco-compensation communication and consultation mechanism. The Inter-Ministerial Joint Conference Office is formed under West Development Division of NDRC. In December 2016, the MoF, MEP, NDRC and MWR jointly issued the **Guidance on Speeding up**



the Construction of Horizontal Eco-Compensation Mechanism between the Upstream and Downstream Basin (CaiJian [2016] No. 928), which explicitly stipulated the guiding ideology, basic principles and work objectives to establish the horizontal eco-compensation mechanism between the upstream and downstream watershed, and put forward some concrete measures for compensation basis, compensation mode and compensation criteria between the upstream and downstream, as well as establishment of the joint-treatment mechanism and signature of compensation agreements.

The future orientation on eco-compensation will be developed in China as below:

Promote to form a new pattern of eco-compensation: At present, our eco-compensation works are steadily proceeding in various fields with certain outcomes achieved. As a comprehensive compensation category, a relatively mature incentive mechanism has been formed for the eco-compensation in key ecological functional areas. The **Opinions on Improving the Compensation Mechanism for Ecological Protection** (GuoBanFa [2016] No. 31) pointed out that "coordinated combination of classified compensation and comprehensive compensation" is the general layout of our pilot eco-compensation, on the one hand, the classified compensation shall be continuously promoted by means of the pilot and various subsidy policies; on the other hand, it is necessary to study and formulate relevant eco-compensation policies and improve the eco-compensation policy for development-prohibited zone in combination with the ecological protection red-line delineated and strictly followed by the State, and gradually realize the full coverage of eco-compensation in key areas, development-prohibited areas

and key ecological function areas, such as forest and grassland, wetland, desert, ocean, waters, and arable land, so as to basically establish the eco-compensation system in line with China's national conditions.

Establish new ideas for the fund use and financing: the Opinions on Improving the Compensation Mechanism for Ecological Protection (GuoBanFa [2016] No. 31) stipulated that "the various types of compensation funds shall be planned as a whole, and the comprehensive compensation measures shall be explored", it is necessary to form a resultant force through integrating the capitals and magnifying their use effect, so as to ensure that the "lucid waters and lush mountains" can be transferred into "invaluable assets" as soon as possible. Besides the governmental funds, the market mechanism also plays a positive role on the ecological protection. The section of Key Works in 2016 in 2016 Government Work Report pointed out that "the government and social capital cooperation mode shall be improved further". As the field of eco-compensation as concerned, it is necessary to improve the market system for ecological protection and the pricing mechanism of ecological products, which can be realized when the protector get returns through the ecological product trading, and so on.

Build new diversified compensation way: it is necessary to actively innovate the eco-compensation way to fully mobilize the government and the public to initiatively protect the ecological environment. A sustainable industrial model has been formed for the compensation system of public welfare forest and the subsidy & reward policy of grassland ecological protection. At present, the construction of demonstrative eco-compensation area and watershed



eco-compensation pilot which the State is carrying out also provided a plenty of experiences in establishing the diversified compensation mechanism, those practices delivered the specific methods to carry out the counterpart cooperation, industrial transfer, personnel training, and build the park, etc., which is favorable to form a kind of industrial structure suitable for resources and environment carrying capacity in various regions, and promote the transformation of green development. In addition, the eco-compensation is linked with the poverty alleviation policy to explore a new way for poverty alleviation without sacrificing the ecological environment, which is an important measure to promote the innovation of eco-compensation mechanism and institution.

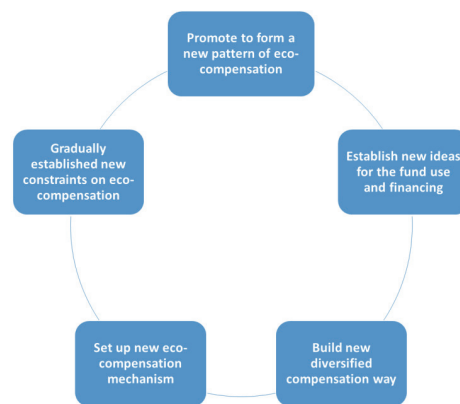
Set up new eco-compensation mechanism:

As the eco-compensation is an extensive and complex work, it is very important to establish government coordination mechanism for the effective implementation of eco-compensation mechanism. In accordance with the Opinions on Improving the Compensation Mechanism for Ecological Protection (GuoBanFa [2016] No. 31), the inter-ministerial coordination mechanism composed of the NDRC and MoF in conjunction with the relevant sectors shall be set up to form a working mechanism of mutual cooperation and overall coordination, which is conducive to string the responsibilities of various sectors into a sound work chain of eco-compensation, and direct the smooth proceeding of eco-compensation works.

Gradually established new constraints on eco-compensation: The Opinions on Improving the Compensation Mechanism for Ecological Protection (GuoBanFa

[2016] No. 31) is a macro guidance to the eco-compensation works in various fields in China. It is an inevitable path to formulate the regulations on eco-compensation on the basis of pilot experiences summarized, which defines the basic framework of eco-compensation purpose, principle, scope, type, rights & responsibility, standard, implementation and supervision, etc. and enhances the legal enforceability and operability. At present, the State Council has already done various works on the eco-compensation legislation and accumulated the related experiences. Some local governments also formulated the special measures for implementation of eco-compensation specific to certain environmental factors, such as the farmland and biodiversity in view of the actual ecological environment. For example, Suzhou City Government has introduced the Regulations on Eco-compensation, which promotes the eco-compensation in the form of legislation. Therefore, a very good pre-condition has been available to "research and formulate the eco-compensation regulations, in order to encourage the local government to introduce the relevant laws and regulations or normative files" as stipulated in the Opinions, the effective eco-compensation system will be established in the form of law in due time.

■ Fig. 1 Development direction of eco-compensation





2.1.2 The obvious spatial differentiation of eco-compensation in China

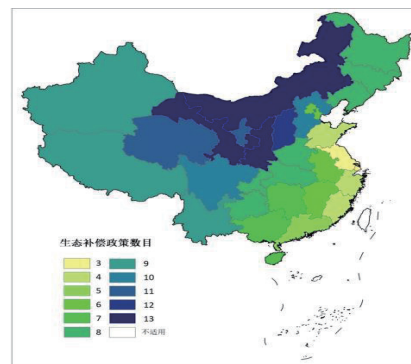
For decades, a series of major projects have been implemented specific to key areas, such as forest, grassland, desert, wetland, watershed, soil & water conservation areas in China and a massive of funds have been input. According to the preliminary statistics, there are above 20 state policies in terms of ecological protection and construction and input funds up to RMB one trillion, although not all of these policies are related to eco-compensation in the strict sense, they brought a good ecological and social effects.

It is indicated from the sorting out that, the current eco-compensation was implemented with obvious the spatial differences, which is quite different among many provinces, generally presenting the less eco-compensation in the southeastern and more in the southeast (see Fig. 2). The eco-compensation policy laid certain emphasis on the northwest and southwest areas with relatively backward economy but relatively important ecological functions, followed by the Northeast China, and then North China, East China and Southern China. Inner Mongolia, Shaanxi and Gansu are benefiting from 13 eco-compensation policies, the highest in whole country; Shanxi benefiting from 12 policies, Qinghai and Ningxia benefiting from 11 policies, also at a high level. The eco-compensation policies mainly focus on each autonomous region, 13 polices for Inner Mongolia, 11 polices for Ningxia, 9 polices for Xinjiang and Tibet, and 7 polices for Guangxi.

From the perspective of the policy coverage, 2 of all eco-compensation policies have been implemented in 31 provinces (autonomous regions and municipalities directly under the central government) except for Hong Kong,

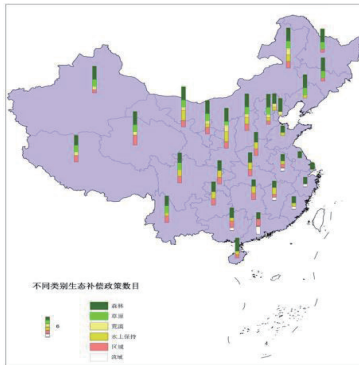
Macao and Taiwan, which are the state forest eco-compensation and wetland subsidy funds. The remaining 20 policies are implemented in some provinces; among them, the minimum policy coverage is one province, which is the ecological safety barrier protection and construction in Tibet and Three-River Source national comprehensive experimental area for ecological protection in Qinghai. The maximum policy coverage is the returning farmland to forest (grass) project, which has been implemented in 25 provinces. Forest eco-compensation is mainly distributed in the northern and western regions, and less in the eastern region; the grassland eco-compensation mainly benefits to the northern and western pastoral areas; the desert eco-compensation focuses each province and autonomous regions in the northwest; the eco-compensation for soil and water conservation is mainly concentrated in the regions at the south of western Inner Mongolia, and north of Sichuan, Guizhou and Hunan provinces; the regional eco-compensation is relatively less in the eastern coastal areas, and evenly distributed in other areas. The watershed eco-compensation is mainly concentrated in Anhui and Zhejiang, Guangdong and Fujian, Jiangxi, Guangxi at the upper reaches, etc. (Fig. 3). Among them, the wetland eco-compensation is not indicated in the map, as it is implemented throughout the country.

■ Fig. 2 Spatial distribution of eco-compensation policy





■ Fig. 3 Distribution of different types of eco-compensation policies



As a coordination mechanism for contradiction between the social economic development and the ecological protection, the eco-compensation policy has also

brought good ecological and social effects on the basis of continuously improving and maintaining the local ecosystem services. With eco-compensation, areas of all kinds of ecological reserves have increased in certain degree, the local ecological service function was improved, and the agricultural and animal husbandry conditions were gradually improved, which promotes the industrial restructuring and development. Meanwhile, the multiple measures can be implemented comprehensively, such as relocation, strengthening infrastructure construction, and improving the social security policies, so that it is possible to gradually step the ecological civilization path with the enhanced production, being well off and good ecology (see Table 1).

🌿 Table 1 Summary of eco-compensation policies and analysis on their effect in China

Compensation Policy for Ecological Protection		Ecological Environmental Benefits	Social and Economic Benefits
Forest	<ul style="list-style-type: none"> Natural forest resources protection project Returning-farmland- to-forest (grass) Project “Three-North” shelterbelt project Coastal shelterbelt system project National Forest Ecological Benefit Compensation 	<ul style="list-style-type: none"> →The forest coverage rate is increased from 33.8% to 40.2% in the upper reaches of the Yangtze River, and from 15.4% to 17.6% in the middle and upper reaches of the Yellow River →The forest coverage rate is averagely increased 3% in the area to implement return farmland to forest (grass) project →The forest coverage rate is increased from 5.05% in 1977 to 12.4% now in the area to implement “Three-North” Shelterbelt Project →The forest coverage rate is increased from 24.9% to 36.9% in the area to implement the coastal shelterbelt system project 	<ul style="list-style-type: none"> →The industrial structure in the forest area is effectively restructured; the employment, presents the diversified pattern; the insurance subsidy policies are implemented basically →The household of returning farmland to forest (grass) solved the problem of food supply through concentrating on the basic ration farming field and improving grain yield by means of the intensive and meticulous farming →The land-bearing capacity is improved in the area to implement “Three-North” Shelterbelt Project, the grain has high and stable yield →The forest industry is developed in the area to implement the coastal shelterbelt system project, the rural industrial structure is adjusted
Grassland	<ul style="list-style-type: none"> Grassland ecological protection subsidy Returning grazing land to grass project 	<ul style="list-style-type: none"> →In 2015, national comprehensive grassland vegetation coverage reached 54%, increased 3% in comparison with that in 2011 →The average vegetation coverage is increased by 5% in the area to implement the returning grazing land to grass project in comparison with that in 2008 	<ul style="list-style-type: none"> →The income growth of herdsmen is accelerated →The livestock improvement rate and the proportion of drylot feeding are increased →The grassland contracting is steadily promoted, the animal husbandry is develop in large scale
Desert	<ul style="list-style-type: none"> Beijing-Tianjin sandstorm source control project Desertification land-banned protection 	<ul style="list-style-type: none"> →In 2009, the total area of desertified land in the Beijing-Tianjin sandstorm source control project area decreases 1.163 million ha. in comparison with that in 1999, the forest coverage rate is increased, the amount of soil erosion and dust-released amount are decreased significantly 	<ul style="list-style-type: none"> →The production conditions of agriculture and animal husbandry are gradually improved, the agriculture and animal husbandry are developed in form of industrialization, which accelerated the poverty relief of the masses



Compensation Policy for Ecological Protection		Ecological Environmental Benefits	Social and Economic Benefits
Wetland	Wetland subsidy fund	→The wetland protection rate was increased from 30.49% in 2005 to 43.51% in 2015	
Watershed	Xin'An River Basin water environment compensation pilot Ting River - Han River upstream and downstream horizontal eco-compensation Jiuzhou River upstream and downstream horizontal eco-compensation Dong River upstream and downstream horizontal eco-compensation Luan River-Tianjin water diversion project upstream and downstream horizontal eco-compensation	→The water quality at the inter-provincial sections are all in compliance with the standard for Xin'anjiang Basin, Ding River - Han River Basin, Jiuzhou River Basin, Dong River Basin, Luanhe-Tianjin water diversion project (except Yangjiao Station section of Ding River - Han River Basin)	→The industrial structure is continuously optimized. The development of secondary industry is slowing down, and the proportion of third industry in GDP is increased in certain →It promotes the government to change the concept of development, the performance evaluation is transferred from GDP to the ecological protection, giving more weights to the ecological and environmental protection, and modern service industry, and establishing "eco-city" concept →It promotes the enterprise to consciously perform environmental responsibility, and the cleaner production audit is implemented
Water and soil conservation	Key national projects of soil and water conservation Key projects of soil and water conservation in the middle and upper reaches of the Yellow River Key projects of soil and water conservation in the middle and upper reaches of the Yangtze River	→By the end of 2012, over 3800 small watershed have been comprehensively treated, covering 58,000 km ² of soil erosion area in key national projects of soil and water conservation →An area of 920,000 ha. of soil erosion has been treated in key projects of soil and water conservation in the middle and upper reaches of the Yellow River →Up to 5445 small watershed have been treated, totally covering 95.800 km ² of soil erosion area in key projects of soil and water conservation in the middle and upper reaches of the Yangtze River	→The agricultural was improved, the rural industrial structure was restructured →The high-standard basic farmland area is increased, the cultivated land resources are effectively protected, and the land productivity is improved →The farmers' income is increase, and the living environment has been improved
Region	Key ecological functional areas Comprehensive treatment of rocky desertification in Karst Area Protection and construction of ecological security barrier in Tibet Comprehensive experimental area for ecological protection in Qinghai Three-River Source Comprehensive control of the Loess Plateau	→As of 2015, 66,000 km ² of karst land and 22,500 km ² of rocky desertification have been treated in the comprehensive treatment of rocky desertification in Karst Area. The expansion of rocky desertification has been restrained, and the area of rocky desertification land is reduced by 7.4% from 2008 to 2012 →As of 2014 in the protection and construction of ecological security barrier in Tibet, the forest area is increased by 1024.2 km ² , the shrub forest area increased by 1036.7 km ² , and the desertified land is decreased by 107,100 ha. The biodiversity has been effectively protected →In Qinghai Three-River Source ecological protection and the construction area, the forest coverage rate was increased from 6.32% in 2004 to 7.01% in 2012, the vegetation coverage in desertification prevention and control spot is increased from less than 15% before treatment to 38.2% now	→The karst rocky desertification control project combined the desertification control with poverty relief, strengthening the development of ecological economic forest, forest economy, ruminant animal husbandry and ecological tourism →In Tibet ecological security barrier protection and construction area, the living level of herdsmen is improved steadily, the use rate of clean energy is substantially increased, and the production and living conditions in rural and pastoral areas have been improved →In the ecological protection and construction in Qinghai Three-River Source, the living conditions and levels of farmers and herdsmen have been improved through the implementing relocation, strengthening the infrastructure construction, and developing the ecological animal husbandry



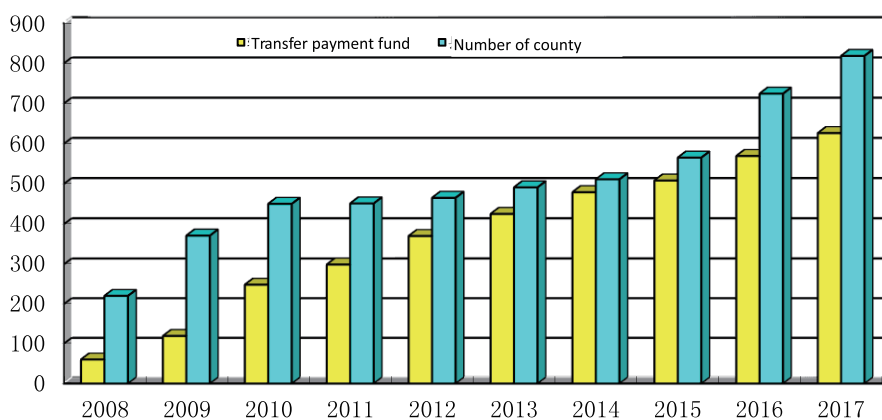
2.2 The eco-compensation policy is becoming mature in key ecological function areas

Since the **Measures of Transfer Payments for National Key Ecological Function Areas (pilot)** was issued by the MoF in 2009, the general transfer payment policy of Central Finance is becoming more sound for key ecological function areas, the central government has set up the eco-compensation mechanism for key ecological function areas, which purpose is “to safeguard the national ecological security, promote the ecological construction, guide the local government to strengthen the ecological protection, and improve the supporting capacity of local government in the national key ecological function area to provide the fundamental public services”.

Since 2008, the central government has gradually increased the transfer payments; both allocation coverage and subsidy amount

are continuously increased. When the transfer payment was established for national key ecological function areas in 2008, a total of 221 counties (including county-level city, district under jurisdiction of city and banner, hereinafter referred to as the "county") was incorporated into the scope of transfer payment; in addition to 452 counties on the list, the Central Finance extended such subsidies to the development-prohibited region and important eco-functional areas listed in the "National Ecological Function Zoning" in 2011; in 2017, the subsidies was expanded up to more than 800 counties¹. It is expected that the transfer payment can cover about 1000 counties in 2020. Meanwhile, the fund amount of transfer payment is also increasing continuously; the central government input the transfer payment funds to the national key ecological functional areas from RMB 6.051 billion in 2008 to RMB 62.7 billion in 2017, increased by 9 times over 9 years.

■ Fig. 4 Progresses of transfer payment policy in key ecological functional areas



* ¹ Sourced: http://www.mof.gov.cn/zhuantihuigu/cczqzyzfglbf/ybxzyzf_7774/zdstgnqzyzf_7776/



In order to ensure the transfer payment fund can play due role, the MEP and MoF jointly released several files in succession since 2011, such as the **Measures to Assess the Ecological Quality of County within National Key Ecological Function Areas** (HuanFa [2011] No. 18), and **Index System to Monitor and Assess the Ecological Quality of County within National Key Ecological Function Areas** (HuanFa [2014] No. 32), all of which provided that the regular assessment shall be conducted in combination of the local self-examination and random inspection by the Central Government, the allocation of transfer payment funds shall be linked with the assessment results on county ecological environment of each. According to the preliminary statistics, the regional ecosystem service function tends towards being stable, and the quality of natural ecosystem is gradually improved too. The transfer payment has played a positive role in the ecological protection of the national key ecological function areas.

In addition, the sectors of forestry, agriculture, water conservancy, land, and marine etc, according to the division of labor, respectively carried out the eco-compensation works in the fields of forest, grassland, wetland, desert, ocean, water and farmland.

2.3 The positive breakthrough made in trans-provincial watershed eco-compensation

2.3.1 Overall progress of the trans-provincial watershed eco-compensation

In 2011, Xin'An River Basin water environment compensation, the first inter-provincial pilot in China was launched under the active promotion of the MEP and MoF. In

2016, the horizontal eco-compensation was actively promoted between the upstream and downstream in Ting River-Han River Basins, Jiuzhou River Basin, Dong River Basin, Luanhe-Tianjin Water Diversion Project; the relevant provinces were promoted to sign the eco-compensation agreement. At present, the provincial (autonomous regions and municipalities) governments, such as Anhui and Zhejiang, Fujian and Guangdong, Guangxi and Guangdong, Jiangxi and Guangdong, Hebei and Tianjin have respectively signed the horizontal eco-compensation agreement on Ting River-Han River Basins, Jiuzhou River Basin, Dong River Basin, and Luanhe-Tianjin Water Diversion Project. The core content of horizontal eco-compensation agreement is that, upholding the principle of "cost and benefit sharing, cooperative treatment"; both the upstream and downstream provinces establish award-penalty mechanism with the sectional water quality of river basin at the inter-provincial boundary as the assessment basis, it is only allowed to better water quality and forbidden to worsen. The local governments along the river formed a long-term mechanism of watershed protection and treatment by various measures, including strengthening cooperation and exchanges, implementing joint prevention and control and watershed treatment, and unifying monitoring and supervision, so as to ensure that water quality of the basin can be continuously improved and stabilized.

In 2016, the Central Government totally allocated award funds of RMB 1.90 billion for eco-compensation to some provinces (autonomous regions), such as Anhui, Fujian, Guangxi, Jiangxi and Hebei, in order to support some projects to be carried out, such as related watershed pollution control,



ecological protection, comprehensive improvement of rural environment, and environmental risk prevention. In 2017, the allocated eco-compensation-reward fund for relevant provinces (autonomous regions), including Xin'An River Basin, Ting River-Han River Basin, Jiuzhou River Basin and Dong River Basin, amounted to RMB 899 million.

2.3.2 Effectiveness of trans-provincial watershed eco-compensation

In 2016, it is shown from the joint monitoring results between the upstream and downstream provinces (autonomous regions) that water quality in above basins can meet the requirements of respective horizontal eco-compensation agreement. Overall water quality of Xin'An River Basin maintains at Class-II or so for many years, the eutrophication trend has been contained, and the water environment is gradually improved, which provides a demonstration to establish eco-compensation in other inter-provincial basins; Overall water quality of Ting River-Han River Basin, Jiuzhou River Basin and Dong River Basin at the inter-provincial section reached Class-III criteria; water quality of Luanhe-Tianjin Water Diversion Project is also improved from Class IV to class III. Such pilots have promoted communication and coordination between the upstream and downstream provinces, and initially established a long-term work mechanism between them, such as joint monitoring, joint law enforcement, emergency response and joint pollution control.

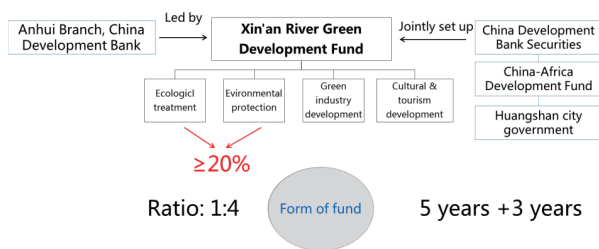
1) For Xin'An River Basin, the green development fund was established to explore how to set up a sustainable, stable and benign investment mechanism.

From 2011 to 2014, Anhui and Zhejiang launched the first phase of eco-compensation pilot in Xin'An River Basin; from 2015 to 2017, the second phase of horizontal eco-compensation was carried out. Based on the cooperation with the CDB in the first round of pilot, Huangshan City actively explores how to set up Xin'An River Basin Green Development Fund, and encourage the social capital to participate in the ecological protection of Xin'An River. As led by the National Development Bank Anhui Branch, this Fund is jointly set up by China Development Bank Securities Ltd. Co., China-Africa Xinyi Investment Ltd. Co., and Huangshan Government, which mainly invests to the ecological administration, environmental protection, green industry and cultural tourism, accelerate the industrial transformation and green development of Huangshan City, realize transformation from the former end treatment to the source control, from the excellent ecological resources to the ecological asset, so as to strive for a socialized, diversified and long-term protection & development mode. The first phase of green development fund is structured as 1:4, the pilot fund is allocated up to RMB 400 million with an effective term of 5 years + 3 years, that is, the first 5 years is the investment period, and then such investment shall be returned in proportions of 30%, 30% and 40% in the next 3 years. Such fund was mainly in form of the creditor's business at the initial stage, and then introduced the equity investment in the later term. At present, the first batch of 10 projects has been identified to be eligible to the fund with strict screening, of which the investment amount is not less than 20% for the ecological project, in order to ensure that such pilot funds can be utilized for the purpose specified. Meanwhile, with the basin water



environment compensation as a platform, the strategic cooperation between Anhui and Zhejiang is increasingly deepened; two provinces further strengthen their cooperation and explore the diversified cooperation modes through some measures, such as the launching of Huangshan-Hangzhou High-Speed Railway. The joint linkage and common development are expected between the upstream and downstream.

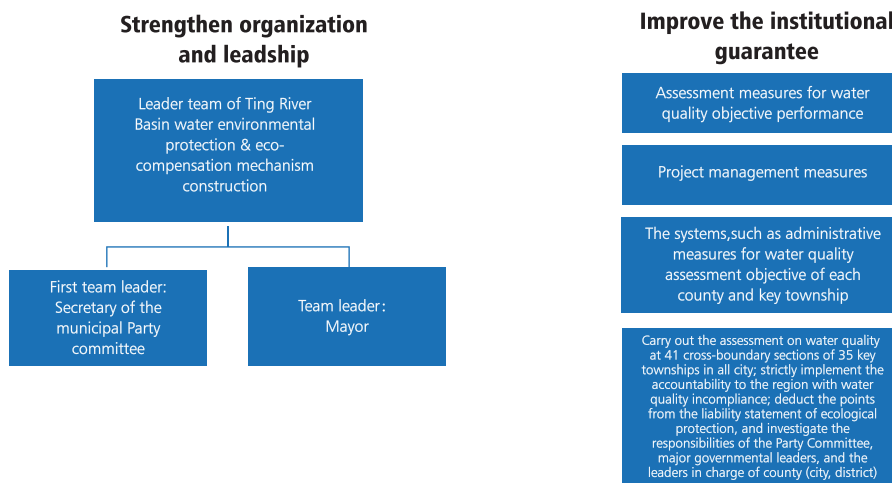
■ Fig. 5 Frame diagram of Xin'anjiang Green Development Fund



Government attach great stress to the eco-compensation pilot in Ting River-Han River, specially form a steering group for water environment protection and eco-compensation mechanism construction in Ting River with City Party Committee Secretary as the first group leader and mayor as group leader. To further reinforce the responsibility and promote the pollution control by means of assessment, Longyan City has introduced a series of systems successively, including water quality evaluation measures, project management measures, and administration measures of water quality evaluation for each county and key towns; and carry out monitoring and evaluation on water quality of 41 boundary sections for 35 key towns and township all over the city. The local governments where water quality is beyond the standards shall be strictly carried out accountability; marks shall be deducted from the Party Committee and Governmental Ecological Liability Statement, and the responsibilities shall be investigated and affixed for main leader and relevant leaders of the county (city, district) Party Committee and Government.

2) For Ting River-Han River, the watershed management is promoted by means of supervision and evaluation, and the subject's responsibilities is urged to performed in place: in Fujian Province, Longyan City Party Committee and City

■ Fig. 6 Responsibilities of eco-compensation subject in Ting River Basin





3) For Jiuzhou River Basin, the pollution control is intensified for livestock and poultry breeding, and new model of ecological farming has been vigorously promoted to realize the recovery of livestock residues as possible: The Party Committee and Government of Guangxi Zhuang Autonomous Region attach great importance to the comprehensive improvement of water environment in Jiuzhou River Basin, and set up comprehensive improvement offices for Jiuzhou River Basin water environment at three levels of the autonomous region, city and county. The government of the autonomous region has convened special conferences for several times to promote the relevant works, strengthen supervision and treatment responsibility, and comprehensively implement policies. Specific to the issue of large farming pollution emissions, Yulin City Government released some normative documents, including **Opinions of Yulin City on Strengthening the Livestock Pollution Control, and Administrative Provisions of Yulin City on Pollution Control for Small and Scattered Pig Farms (Households)**, etc.; and promoted new model of ecological breeding and recovery of livestock manure. Luchuan County and Bobai County have demolished 141 pig farms and settled 93,000 pigs, and strongly promoted the "elevated net bed + microbial probiotics" ecological farming model in 320 large-scale farms with total 206,000 pigs (in stock). This model can reduce discharge of aquaculture wastewater by about 90%, and livestock manure can be fermented into organic fertilizer at the bottom.

4) For Dongjiang River Basin, the mechanism and institutional construction has been strengthened: Ganzhou City Government set up a leading group headed by

the mayor, and specially formed Dongjiang-Source Ecological Protection Bureau at the county level and staffed with 12 members, which is responsible for dispatching, coordinating and promoting the ecological protection and compensation in Dong River source area. The **Interim Administrative Measures of Ganzhou City for the Horizontal Eco-Compensation Funds between the Upstream and Downstream of Dongjiang River Basin** was promulgated, which provides policy basis and institutional assurance for eco-compensation in Dong River Basin.

5) For Luanhe-Tianjin Water Diversion Project, The cage culture in Panda Reservoir, as a historical problem is to be solved: As a historical problem, the cage culture in Panda Reservoir involves resettlement of inhabitants and poverty alleviation in the reservoir area. In order to improve water quality, the provincial leaders, such as provincial governor of Hebei, Zhang Qingwei has presided over special meetings for several times for deploy and arrangements; the city government leaders of both Tangshan and Chengde personally set up headquarters and work teams, formulated the scheme, and refined the criteria for award and subsidy, capital management, and measures for petition and social stability. Since November 2016, 59,591 net cages have been cleared from Panda Reservoir, accounting for 76% of total net cages, and cleaned up 68.535 million kilograms of fish. Among them, Qianxi County in Tangshan City faced the most serious task, which need clean up 40705 net cages and 41.988 million kilograms of fish, and now all clean-up tasks have been completed. Before the end of 2017, Hebei Province Government will completely ban and clean up cage fish farming in Panda Reservoir.



■ Fig. 7 Clean-up of cage culture in the Luanhe-to-Tianjin Water Diversion Watershed



2.4 Comprehensive eco-compensation mechanism under being explored

The comprehensive eco-compensation is explored by the state for Qinghai Sanjiangyuan National Park. In 2016, the Central Leading Group for Comprehensively Deepening Reform approved to set up Qinghai Sanjiangyuan National Park, and form Sanjiangyuan National Park Administration Bureau under the jurisdiction of Qinghai

Provincial Government, which incorporates the responsibilities of ecological protection and administration originally scattered in the sectors of forestry, environmental protection, land, housing construction, water conservancy, agriculture and animal husbandry, into the Administration Bureau, so as to promote pilot eco-compensation in Three-River Sources, and arrange skills training and employment transfer compensation for herdsmen, grassland management cost, and ecological environment monitoring funds etc. every year.





3 MAIN PRACTICES OF ECO-COMPENSATION

In general, the local eco-compensation practices can be divided into four categories: the first is the financial incentive mechanism based on the environmental improvement; the second is the transfer payment mechanism based on the ecological environment factors, the third is the compensation mechanism oriented the regional cooperation; and the fourth is the market-based compensation mechanism.

3.1 Financial incentive mechanism based on environmental improvement

In recent years, the financial incentive mechanism based on the environmental improvement was carried out in the field of water quality and air quality, and so on. Main approaches are aimed to improve the environmental quality or meet the standards, encourage the continuous compliance of environmental quality within the own jurisdiction and promote the non-compliance areas to accelerate the environmental improvement through establishing the supporting financial mechanism and supplemented with assessment and regulatory means. Due to the actual situations in each region, there are many differences in aspects of incentive funds, compensation criteria, compensation factor and funding sources and so on.

At present, nearly 20 provinces have introduced the compensation policies based on water quality assessment. Some provinces, such as Jiangsu, Zhejiang, Jiangxi, Shandong, Henan, Hubei, Sichuan, Guizhou and

Yunnan, have introduced the non-compliance or compliance compensation mechanisms between the upstream and downstream; Some provinces, such as Beijing, Hebei, Shanxi, Liaoning and Hunan have implemented the financial fund-withheld mechanism based on water quality assessment. By the end of 2011, Shaanxi Province respectively delivered RMB 3.00 million of eco-compensation funds to Dingxi and Tianshui Cities in Gansu Province at the upper reaches of Weihe River due to their efforts on water quality protection, which became the first case of inter-provincial volunteered eco-compensation in China. It is also an important practices of joint comprehensive management in the river basin in China that the financial incentive mechanism of "providing compensation due to the non-compliance" and "compensate for the compliance" is established according to the results of water quality at the boundary section, in combination with the factors, such as times of non-compliance pollutant concentration, pollutant flux, and rate of compliance water quality.

In terms of air quality, when some provinces, such as Shandong, Henan, Hubei and Sichuan, and some cities, such as Tianjin, Guiyang and Yinchuan, are exploring how to establish the compensation mechanism of air environment quality, they are mainly oriented the improvement of ambient air quality, and provide certain compensation according to the air compliance rate of region under their own jurisdiction, and conduct the financial allocation of funds provided that environmental air quality can meet the target of improvement.



Column 1: Main Practices of Regional Compensation for Water Environment in Jiangsu Province

The regional compensation for water environment has been implemented in Jiangsu Province since 2007, the **Measures of Jiangsu province for Regional Compensation of Environmental Resources (Trial)** was issued to promote water environmental compensation in three phases.

In the first phase from 2007 to 2010, the compensation was conducted in terms of water pollutant flux in Taihu Lake Basin. At the end of 2007, Jiangsu Province formulated the **Pilot Program of Regional Compensation for Environmental Resources in Taihu Lake Basin**, which was formally effective since 2009. In the second stage from 2010 to 2014, the regional compensation was conducted in terms of water environmental quality in Tongyu River Basin. Referring to the experiences of regional compensation in Taihu Lake Basin and the requirements of clean-water gallery protection for Tongyu River, the Jiangsu provincial government released the implementation of the **Pilot Work Program on Regional Compensation of Water Environmental Quality in Tongyu River** at the second half of 2010. In the third stage from 2014 to now, the two-way compensation was implemented in whole basin all over Jiangsu Province according to the improvement targets of water quality. Jiangsu provincial government issued the **Implementation Measures of Jiangsu Province for Water Environment Regional Compensation (Trial)** at the end of 2013, which explicitly provides that the two-way compensation system will be firstly set up in China and applied in all over province since October 1st, 2014. The **Work Program of Jiangsu Province for Water Environment Regional Compensation (Trial)** was also released subsequently.

Basic thoughts: If water quality monitored at the boundary section from the upstream city and county is not in compliance with the criteria, the upstream city and county shall pay compensation funds to the provincial finance in terms of the incompliance rate of water quality and compensation criteria specified by Jiangsu Province, and then the provincial finance compensate such funds to the downstream city and county. If the upstream water quality is better than the water quality objectives, the downstream city and county shall pay compensation funds to the provincial finance in terms of the compliance rate of water quality and compensation criteria, and then the provincial finance compensate such funds to the upstream city and county.

Accounting of compensation fund: based on the water quality results monitored and approved by Environmental Protection Department of Jiangsu Province, when the specified sectional water quality is inferior to the water quality objectives, the compensation fund is calculated as: “incompliance rate of evaluation factor concentration × compensation base”, when the sectional water quality meets the standards, the compensation amount is calculated according to the criteria of monthly RMB 200,000 per section.

According to the statistics, the compensation funds of whole province amounted to RMB 400 million in 2015, of which the positive compensation reached to RMB 320 million and the negative compensation to RMB 80 million; in 2016, the compensation funds of whole province amounted to RMB 290 million, of which the positive compensation reached to RMB 220 million and the negative compensation RMB 70 million. After the national and provincial ten-measure action plan to tackle water pollution were introduced, the Environmental Protection Department of Jiangsu Province and Department of Finance jointly revised and supplemented the original scheme and relevant supporting measures, increased the compensation sections from 66 to 112, and enhanced the compensation criteria by category



Column 2: Main Practices of Atmospheric Eco-Compensation in Shandong Province

In March 2015, General Office of Shandong Provincial People Government issued the “**Interim Measures of Shandong Province on the Eco-Compensation of Environment Air Quality** (LuZhengBaiZi [2015] No. 44).

Overall thoughts: According to the principles of “the gradual improvement of environment quality shall be taken as a mandatory requirement for regional development” and “the benefits is liable for protection; polluter is liable for pays”, the year-on-year change of quarterly average concentration are taken as an evaluation index for fine particulate matter (PM_{2.5}), respirable particulate matter (PM₁₀), sulfur dioxide (SO₂), and nitrogen oxide (NO₂) in city divided into districts to establish the incentive assessment and eco-compensation mechanism. The assessment weights of PM_{2.5}, PM₁₀, SO₂ and NO₂ are 60%, 15%, 15% and 10% respectively.

Classified examination: According to the dilution-diffusion conditions of atmospheric pollutants by natural weather, 17 cities of whole province are divided into two categories for assessment. The first category includes Qingdao, Yantai, Weihai and Rizhao city with the dilution-diffusion coefficient adjusted as 1.5; and the second category includes Ji’nan, Zibo, Zaozhuang, Dongying, Weifang, Jining, Tai’an, Laiwu, Linyi, Dezhou, Liaocheng, Binzhou and Heze city with the dilution-diffusion coefficient adjusted as 1.0.

Assessment formula: Score = [(average concentration of PM_{2.5} in the same quarter of last year - average concentration of PM_{2.5} in the quarter assessed in this year) × 60% + (average concentration of PM₁₀ in the same quarter of last year - average concentration of PM₁₀ in the quarter assessed in this year) × 15% + (average concentration of SO₂ in the same quarter of last year - average concentration of SO₂ in the quarter assessed in this year) × 15% + (average concentration of NO₂ in the same quarter of last year - average concentration of NO₂ in the quarter assessed in this year) × 10%] × adjusted dilution-diffusion coefficient

Amount of compensation funds of a city divided into districts = assessment score × coefficient of eco-compensation fund

The concentration of pollutant is in unit of mg/m³. The eco-compensation fund coefficient is RMB 400,000 / (mg/m³). In 2015, the eco-compensation funds allocated by the provincial government amounted to RMB 132.61 million, and the eco-compensation funds paid by relevant cities reached to RMB 19.71 million, totally allocated RMB 112.90 million. Among them, the largest amount of fund up to RMB 14.71 million was allocated to Linyi City; while Dezhou and Liaocheng received the least funds, only RMB 3.10 million.

3.2 Transfer payment mechanism based on ecological factor

Various regions have carried out positive exploration in the field of transfer payment mechanism based on ecological environment factors, and formed a variety of compensation modes. Jiangsu Province implemented the eco-compensation mechanism based on the ecological protection redline in a pioneering way in China, and calculated compensation funds in terms of the level, type and area of ecological protection red-line zone, as well as the regional financial capacity and so on. The provinces, such as Zhejiang, Fujian, Jiangxi and Guangdong, take the basic factors, such

as water environment, ecological forest and water resources to reflect the regional ecological function and environmental quality as the basis of allocation, set the relevant compensation factors and weights, and establish the financial transfer payment funds for ecological protection. Zhejiang provincial government actively integrates the eco-compensation funds and ecological forest compensation policy, the next step is to study how to establish and improve the reward and punishment system for energy conservation and emission reduction, and "environment pension system" for the ecological function area, so as to form the financial reward and punishment mechanism for more



comprehensive and green development. In addition, nearly 30 provinces have established the provincial financial eco-compensation fund based on the forest ecological benefits.

Some provinces, such as Heilongjiang, Shandong and Guangdong, also arranged special funds for wetland protection.

Column 3: Main Practices of the Financial Transfer Payment for Ecological Protection in Zhejiang Province

Zhejiang provincial government successively released the **Interim Measures of the Provincial Special Financial Subsidies for the Ecological Protection in Qiantang River Source** in April 2006, and the **Measures of Zhejiang Province for Financial Transfer Payment of Ecological Protection (trial)** in February 2008; and further amended and improved the **Measures of Zhejiang Province for Financial Transfer Payment of Ecological Protection (trial)** in accordance with the requirements of “expansion, merger and improvement” in February 2012. At present, the basic elements of “forest, water and air” to reflect the regional ecological function and environmental quality are taken as the basis of allocating the financial transfer payment for ecological protection and set the relevant compensation factors and weights, and conduct the assessment and reward or punishment in terms of the compliance rate of water and air environment quality, and then calculate and allocate the relevant fund by sort or level. The provincial financial transfer payment fund for ecological protection was increased from RMB 200 million in 2006 to RMB 2.10 billion in 2016, totally RMB 14.3 billion arranged, which has been coordinated and used by the local governments as the expenditures for environmental protection.

Column 4: Main Practices of Eco-Compensation based on Ecological Protection Red-Line in Jiangsu Province

Based on the regional planning of ecological red-line, the corresponding Interim Measures of Jiangsu Province for Transfer Payment for Eco-Compensation (Trial) were formulated. Focused on the overall requirements and deployment of Jiangsu provincial party committee and provincial government on promoting for ecological construction, this Measures is to explore how to establish the eco-compensation system of transfer payments through innovating the institutional mechanisms, increase the financial investment, highlight the guidance of “the protector shall be benefited” and “more contributions, more benefits”, and provide the appropriate compensation to the region where makes certain contributions due to the ecological protection. The transfer payment for eco-compensation is a kind of general transfer payment, which is divided into two components: subsidy and reward. The subsidy funds for each region are calculated in terms of the factors, such as the level, type and area of ecological protection red-line zone, as well as the regional financial capacity and so on. The reward funds are determined according to the protection situations of ecological protection red-line region of each city and county (district) in the previous year.

Through implementing the eco-compensation policy, the scale of investment in ecological protection is enlarged level by level. Since 2013, the provincial finance has invested RMB 6.5 billion of eco-compensation funds, which are all used for the environmental protection, ecological restoration and eco-compensation in the ecological protection red-line areas in Jiangsu Province. Suzhou City takes the lead in establishing the local eco-compensation funds, and arranges RMB 800 million eco-compensation funds each year at two-tier finance of city and county. It is indicated from the third-party evaluation on supervision and management of ecological red-line for continuous three years that, RMB 6.5 billion eco-compensation funds at the provincial level have directly and indirectly led to the local ecological input of RMB 29.6 billion.



3.3 Compensation mechanism oriented to the regional cooperation

Being different from two former compensation mechanisms, the compensation mechanism oriented to the regional cooperation is a "hematopoiesis-type" compensation, which can form the hematopoietic function and self-development mechanism through transferring compensation funds into the technical or industrial projects, so that the external compensation can build the self-accumulation and self-development abilities. At present, many regions have attempted some relative mature practices, such as park cooperation (off-site development), counterpart cooperation and setting up the ecological posts. The park cooperation between Jinhua and Panan in Zhejiang Province is the first exploration in this aspect; after that, Shaoxing City also experienced the similar practices, the area with

relative abundant environmental capacity provides development space to the area with sensitive environment to establish "Off-Site Development Test Site for Eco-Compensation", so as to promote the rational distribution of productive forces, and further enhance the development drive for the area with sensitive environment. Beijing and Tianjin, as the water-received areas at the middle route of South-to-North Water Diversion Project, compensate the provinces at Danjiangkou Reservoir area and the upstream area, such as Hubei, Henan and Shaanxi by means of counterpart cooperation. Based on the supporting funds of National Grassland Ecological Protection Award and Subsidy, Qinghai Province firstly explore the public benefit post pilot for grassland ecological protection in Three-River Source region, assigning one administrator per 2000 hectares of grassland, and totally 13894 administrators in all over province.

Column 5: Park Cooperation between Jinhua and Panan in Zhejiang Province (Off-Site Development)

As a mountainous county under the jurisdiction of Jinhua City, Panan is one of main source areas of Qiantang River, Qu River, Ling River and Cao'E River, be famous as the "progenitor of mountains and sources of waters" of Zhejiang Province. Water quality and quantity that it provided will significantly affect the downstream water security. In the event that Panan safeguards the ecological environment without developing the industry, it will be the biggest contribution to the lower reaches. However, it is difficult to get rid of poverty fundamentally for a poor county if Panan doesn't develop the industry and only relies on the "blood transfusion type" poverty relief.

In order to protect water sources, Jinhua city government launched the "hematopoiesis-type" eco-compensation in June 1995 with approved by Zhejiang provincial government, and set aside 3.8 km² of land in the local industrial park to establish Jin-Pan Poverty Relief Economic and Technological Development Zone as an industrial base of off-site development for Panan County to relieve poverty. Accordingly, Jinhua City asks that Panan County refuses to approve the polluting enterprises and protect the environment of water source area, so as to keep water quality above Class III drinking water standards. Meanwhile, Jinhua promised to return all income taxes from the Development Zone to Panan County as the compensation to the upstream areas due to water source protection and development rights restrictions.

Through implementing the off-site development, the industrial sales value, foreign exchange from export, and taxation from Jin-Pan Development Zone all accounted for 1/4 such volumes of Panan county since 2003; the number of hi-tech enterprises accounted for 3/4 of whole county, creating jobs for about 1000 persons from Panan county. Meanwhile, the ecological environment of Panan County has also been improved significantly. Currently, a "Nationally Designated Eco-Demonstration Region" has been formed; the forest coverage reaches up to 80% in whole county; 98% of rivers of whole county are maintained in Class-I water quality, air quality is kept in the state Class I criteria, which has basically realized the objective of "protecting the pure land in the Central Zhejiang to deliver clean river water to people downstream".



3.4 Market-oriented compensation mechanism

The market-based compensation mechanism is the supplement to the financial transfer payment, which can realize the value and paid use of the regional ecological services as possible. In the second phase of the eco-compensation pilot, Huangshan City, Anhui Province actively explored to establish Xin'an River Green Development Fund, fully played role of the market in allocation of resources, and encouraged and supported the social forces to invest in the protection and

construction of Xin'an River. Water right trading is a means of the market, Dongyang-Yiwu water right trading in 2000 was the earlier such case in China. After that, many water trading pilots are emerged, such as water ticket trading pilot in Gansu Hongshui River Irrigation District, and water right trading pilots in Inner Mongolia and Ningxia. Since Water Rights Exchange was formally opened in China in June 28, 2016, Beijing has signed contracts with many regions, such as Hebei, Shanxi, Xinmi and Pingdingshan of Henan by means of agreement transfer.





4 CONCLUSIONS

The eco-compensation in China is originated in the compensation for forest ecological benefit, which experienced three phases, namely exploration into the early 1990s, theoretical research in the middle and late 1990s, and combination of theory and practice in 2000s. In 2007, the Guidance on Carrying out the Eco-Compensation Pilot was issued by the former SEPA, which decided to carry out the pilot eco-compensation in four key areas, including the nature reserves, important ecological function areas, mineral resources and watershed water environment protection, marking an important step of eco-compensation institutions in China. However, the eco-compensation was highly concerned by the whole society in China only after the "11th Five-Year", numerous suggestions and proposals have been put forward by NPC deputies and CPPCC members during two sessions every year; the government work report has also given a high priority on it. Since the 21st Century, the basin eco-compensation has become the key field of eco-compensation research and practice in China, the research and practice of key issues, such as subject definition, quantification, and evaluation on performance during basin eco-compensation, have gradually entered the peak period, some provinces have established their own eco-compensation mechanisms. Being promoted by the state, the basin eco-compensation is heading for the joint administration of inter-provincial basin. With the transfer payment of the Central Finance, the eco-compensation has been basically established in key ecological function areas; now, the eco-compensation in the field of grasslands, forests and wetlands are fully proceeding with the state promotion and autonomous

exploration; the eco-compensation in aspects of cultivated land and marine also began attempt; therefore, very positive progresses and achievements have been made in the field of eco-compensation in China, which laid a foundation to establish and improve the eco-compensation mechanism.

However, it is also indicated from the eco-compensation practices in China that, some eco-compensation policies have been implemented for many years with certain problems exposed gradually, such as small compensation range, low compensation criteria, repeated compensation and lack of long-term mechanism, all of which must be optimized or adjusted; some policies are just established preliminarily and need to be improved constantly, which also have the gap to the overall requirements to accelerate the ecological construction. With the release of **Opinions on Improving the Compensation Mechanism for Ecological Protection**, the local government will actively provide the reasonable compensation to the ecological protector in terms of the ecological protection cost, development opportunity cost and ecological service value by means of the financial transfer payment, horizontal compensation or market transactions etc., they will explicitly define the rights and obligations of the ecological protector and beneficiary; promote the economic internality and externality of ecological protection, and gradually form the eco-compensation system of which combined the comprehensive compensation with classified compensation, and a variety of compensation ways can be complementary each other; they will also plan various tasks as a whole, including ecological construction, environmental protection,



industrial re-structuring and orderly transfer of the overloading population. It is of great significance to promote the developed

areas and poor areas can jointly share the achievements of reform and development, as well as speed up the ecological construction.





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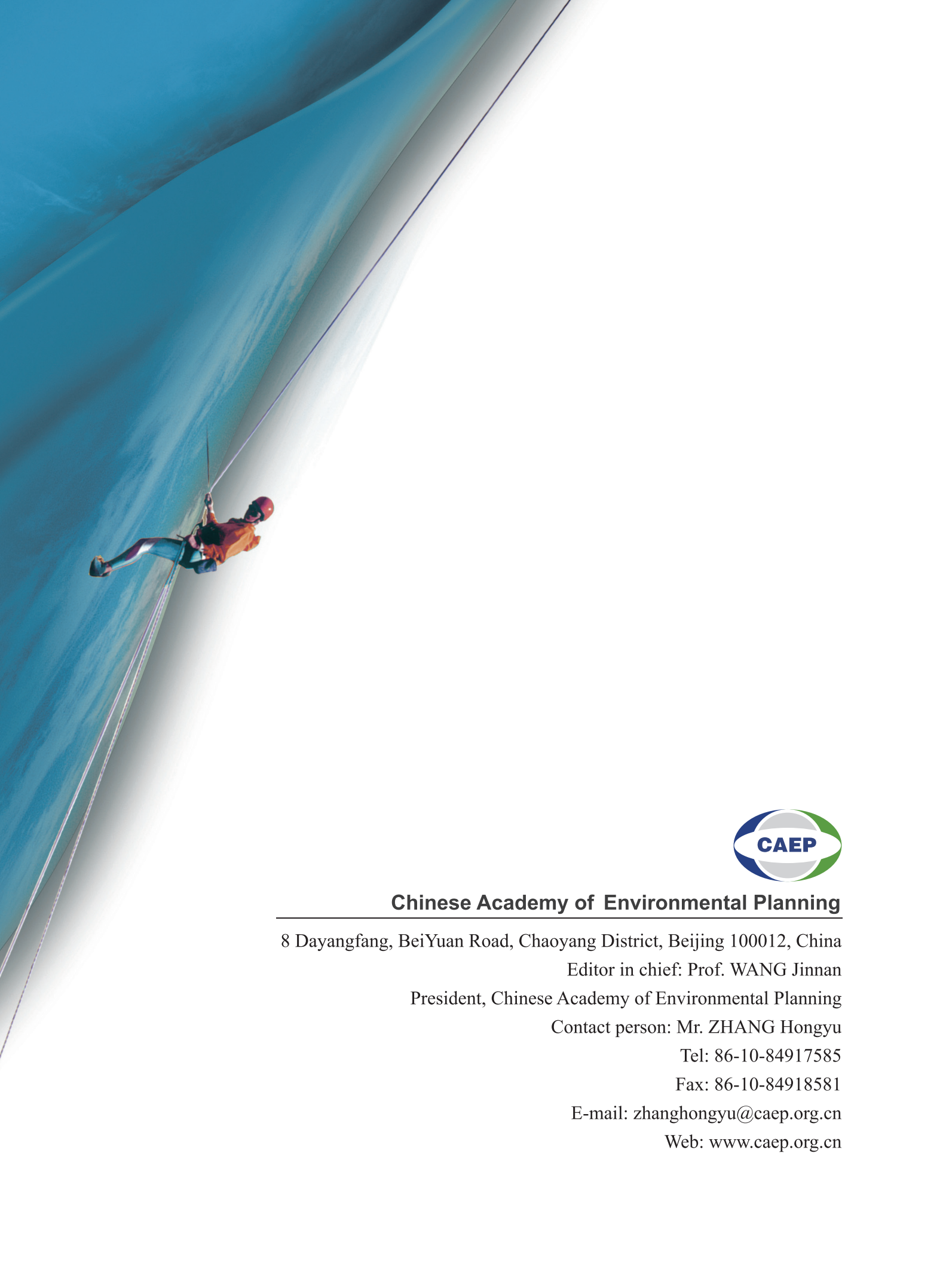
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Chinese Academy of Environmental Planning

8 Dayangfang, BeiYuan Road, Chaoyang District, Beijing 100012, China

Editor in chief: Prof. WANG Jinnan

President, Chinese Academy of Environmental Planning

Contact person: Mr. ZHANG Hongyu

Tel: 86-10-84917585

Fax: 86-10-84918581

E-mail: zhanghongyu@caep.org.cn

Web: www.caep.org.cn